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Estimate of World's Hunger

Well-fed Americans have heard much in recent years about hungry people in other lands. An often quoted remark is that two-thirds of the world's people go to bed hungry each night.

Many generalizations, such as this, have been made about the world's hunger. Little has been done, however, to measure this hunger in specific amounts of milk, grain, beans or other foods.

With programs, such as America's Food for Peace Program, now going forward to help alleviate world hunger the U. S. Department of Agriculture found it desirable to make a rough estimate of the world food deficit.

Here is what the department found:

The world food shortage is roughly equivalent to 35 per cent of U. S. annual milk production . . . plus 40 per cent of U. S. annual dry bean and pea production . . . plus 120 per cent of U. S. annual wheat production.

In making the estimate, USDA only included basic foods considered necessary for people to maintain normal physical activity and health. No consideration was given to what people prefer to eat.

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ADVISORY EDITORIAL STAFF
William A. Albrecht, Chairman
Department of Soils, U. of Mo.
G. B. Gunlogson, Agricultural Engineer
T. J. Rutherford, Chairman, Canadian Farm Credit Corporation
W. T. Spanton, Chief of United States Ag. Education Service.
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IMPORTANT!

Farmer's Digest Summer Publishing Dates

During the summer months, Farmer's Digest is mailed to you every 45 to 50 days instead of monthly. This practice, started years ago, keeps our subscription rates down by giving you fewer copies when you have less time to read. You will receive our August-September issue on or about August 15. Following issues will again arrive near the first of the publication month.

The Publisher

The Farmer's Digest

Volume 25 June-July, 1961 Number 2

Here's How To Use Farm Price Indexes

Ever wonder what to do about farm price indexes? This article explains how to use them in your farm management . . .

Condensed from
University Farm and Home News

PRICE indexes are valuable tools. If you know what a price index number is and what a price index means you're well on your way to understanding important economic changes taking place today.

Index numbers are a short cut, says Elmer Learn, University of Minnesota agricultural economist. They're used to condense a mass of information in a simple series. Most often they are used to compare changes in prices, consumption, production and other factors over periods of time. Here's how an index works:

Suppose that in 1959 a farmer sold 10,000 pounds of live hogs at 16 cents a pound and 20,000 dozen eggs at 30 cents per dozen. A little simple arithmetic shows his total income was $7,600.

Now suppose that in 1960 the same farmer sold the same amounts of hogs and eggs but that hogs were worth only 14 cents per pound and eggs were up to 33 cents per dozen. That means his income climbed to $8,000 in 1960.

So far, so good. But suppose the farmer wants to compare the prices he got in 1959 and 1960, either to analyze his own operations or to explain changes to others. At this point things become a bit complicated.

One way is to look at each commodity separately. In this case the price of hogs dropped $2 or 12½ percent and the price of eggs went up 3 cents or 10 per-

Reprinted from University Farm and Home News, Institute of Agriculture, University of Minnesota, St. Paul 1, Minnesota

ment. This procedure leads to complexity and confusion when many commodities are involved. And what about the average price change?

In this case sales are the same in each year so any change in income is due to price. But notice that this farmer's income rose slightly over 5 percent between 1959 and 1960 (to get the percentage of change, divide $400, the change in income, by $7,600, his income before the change). In this case the average percentage price change—minus 1¼ percent—doesn't even show the correct direction of change.

The answer to all these problems is found in the "weighted" index number. Each commodity in the index is assigned a "weight" which reflects the relative importance of that commodity. In price indexes, average sales or purchases during a given period of time are generally used as weights. Let's pretend that average sales for our imaginary farmer are 10,500 pounds of live hogs and 21,250 dozen eggs. The price index for 1960 is computed as follows:

1959 105 x $16 plus 21,250 x 30c equals $8,054.00.

1960 105 x $14 plus 21,250 x 33c equals $8,482.50.

Index (1960) equals 8,482.50 divided by 8,054.00 x 100 equals 105.31.

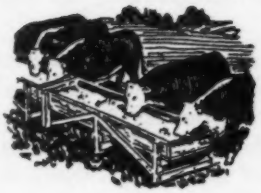
This says that average prices for this farmer were 5.3 percent higher in 1960 than in 1959. The slight difference between this percentage and the percentage change in income is due to the difference in the relative sales of eggs and hogs in 1959 and 1960 from the average.

The weights must stay the same in all years for which the index is computed. Otherwise, the index will reflect quantity changes as well as price changes. This isn't much of a problem when you use the index for state or national sales. That's because the relative sales of commodities on so large a scale change little from year to year.

State and national farm price indexes are computed on this same basis. Of course, the number of commodities included is much greater and "weights" used are average sales for the state or nation.

For light tractor loads, up to 66 per cent greater engine efficiency is possible with reduced engine speeds. This was reported recently by researchers in agricultural engineering at Ohio State University. The engineers said the improvement in efficiency with light tractor loads was due primarily to "reduced frictional horsepower loss."

Cattle Feeding Is Changing



Use of feed additives increases, mechanization expands, and more corn and less forage is going into livestock rations . . .

Condensed from Prairie Farmer
G. R. Carlisle, University of Illinois

INCREASED feed automation and corn acreage have changed cattle feeding during the past 10 years.

One man can now feed more cattle without hiring extra help. The increase in corn acreage has pushed out many acres of forage crops. Consequently farmers are using more and more corn in their rations.

Feed additives have also made an impact. They've increased gains without increasing over-all feed costs. Research at the University of Illinois has studied these many changes. Let's take a closer look at them.

Corn silage can produce more pounds of beef per acre than any other Illinois crop. Two Illinois tests point this out.

In one wintering test, steer calves gained 1.8 pounds a day. Weighing about 430 pounds when they went on test, they were fed corn silage, 1.5 pounds of protein supplement (soybean meal) and minerals.

This was a heavy corn silage that yielded 20 tons per acre. The total gain per acre during the winter months was 2700 pounds of beef. No other crop can do this consistently.

The second trial was to determine how long calves can receive corn silage and still make satisfactory gains. In this test, four lots of steers that weighed about 475 pounds were started on feed. All steers were fed until they weighed about 1025 pounds. They were fed as follows:

Lot 1: A full feed of corn, limited corn silage, protein supplement.

Lot 2: A full feed of corn silage and 1.5 pounds of supplement for 140 days. Then they received the same ration as Lot 1.

Lot 3: A full feed of corn silage plus supplement for 210 days, then fed the same as Lot 1.

Lot 4: A full feed of corn silage for 280 days, then fed the same as Lot 1.

The results, as shown in Table

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1 at the end of the article, indicate that the length of the silage-feeding period definitely affects gains. The longer that cattle receive silage, the slower their gains.

The longer silage-feeding period, however, nearly doubled the pounds of beef produced per acre of corn.

Results also show that cattle receiving a full-feed of grain made the most expensive gains. Gains for the other three lots cost just about the same.

Perhaps the most surprising result was that cattle in all four lots graded low choice. We would expect the cattle full-fed grain to grade somewhat higher. See Table 1 for complete results.

Corn grain was valued at $1.12 per bushel and corn silage at $10 per ton. Different values would have resulted in different costs per hundred pounds of gain. This test, however, did point out that about twice as much beef gain was obtained from corn silage as from corn grain.

The cattle feeder who grows legumes as a soil-conservation practice will find that cattle can turn this roughage into a salable product—beef. However, it isn't necessary to provide pasture for fattening cattle if it isn't needed for soil conservation.

Since cattle feeders who use pasture often wonder what value it actually has, the university has conducted several tests to find out.

In one trial cattle were fed in drylot. Similar cattle were fed limited grain on pasture for two months, then a full feed of grain for another two months while on pasture.

After four months, the pasture's value was calculated at $26.75 per acre in terms of feed saved.

It is not what we have, but how much we enjoy what we have that makes us happy.

The drylot steers, however, were appraised at $2 more per hundredweight due to a higher degree of finish and better hair coats.

A second trial compared a legume-grass mixture fed as silage with the same mixture grazed by cattle. Both lots received ground earcorn. And the drylot cattle received 20 pounds of the legume-grass silage daily.

Cost of gains were similar with pasture rent figured at $12 per acre and the silage, with no preservatives, at $5 per ton. But one acre produced enough silage to feed 6½ steers while the pasture could carry only 2½ steers per acre. The drylot steers were valued at $1 more per hundredweight due to more finish and a better hair coat.

Many additives have been tested, but hormones, antibiotics, and

vitamin A seem to have the most value.

Hormones: We can say briefly that steers not receiving hormones will gain at least 50 pounds less than steers receiving hormones with the same amount of feed. At present prices, a 1000-pound choice steer, not fed hormones, must bring at least $1.25 more per hundredweight to return as much money as a hormone-fed steer. Heifers do not respond as well to hormones.

We can summarize the use of hormones as follows:

1. Feed them to steers continually, stopping only 48 hours before marketing. Cattle on roughage rations respond to hormones as well as cattle on fattening rations.

2. Never implant heifers with anything. If you feed hormones to heifers, feed 5 milligrams daily and stop if side effects appear.

3. Never implant any cattle within five months of marketing. When feeding hormones, stop 48 hours before marketing.

4. Plain cattle often get plainer when implanted, especially if they are sold after a relatively short feeding period.

5. Steer calves are the safest class of cattle to implant. Implant them shortly after they arrive on the farm. Start feeding hormones about seven months after implanting.

Antibiotics: Antibiotics have given the best response when fed with roughage rations during the winter months. When fed with fattening rations their benefits decrease, especially when such rations are fed during the summer months.

Some feeders also feel they have less trouble with foot rot when they feed antibiotics. Seventy-five milligrams of antibiotic per head daily during the winter months is probably a good investment.

Vitamin A: Illinois feeders are encountering more and more cases of apparent vitamin A deficiency. Often the deficient cattle are receiving rations formerly thought to be adequate in carotene. Why this problem exists is not yet known. Research studying this problem is under way at universities in Illinois and other states.

Until this problem is solved, it's good insurance to feed an extra 12,000 to 15,000 international units of vitamin A to each steer daily in the protein supplement.

Dry dairy cows and springing heifers should receive excellent quality hay. If hay is poor, feed two pounds of alfalfa leaf meal per cow per day.

At least half of this extra vitamin A should be of true vitamin A. The rest can come from carotene, the fore-runner of vitamin

A that's found in alfalfa meal and other feeds.

Classes of Cattle Fed in Illinois

The six classes of cattle most often fed in Illinois are ranked in Table 2 at the end of the article on the following characteristics:

1. Percent of total investment required for feeder purchase.
2. Cost of gains.
3. Suitability for large amounts of roughage.
4. Rate of turnover—especially important in downward turn of cattle price cycle.
5. Outlook for margin between buying and selling price in 1961.
6. Disease and death loss risks.

In summarizing the table, calves require the smallest investment. Heavy steers require the largest investment and will make the highest-cost gains, whereas steer and heifer calves make the cheapest gains.

Steer calves can utilize the most roughage, followed by yearling steers, plain cattle, heifer calves, yearling heifers, and heavy steers.

Concerning the outlook for margin between buying and selling price, heavy steers and plain cattle look the brightest. The outlook is not so optimistic for steer and heifer calves. Yearling steers and heifers may or may not bring a higher price after they are finished.

Steer and heifer calves usually have the highest disease losses while heavy steers have relatively fewer losses.

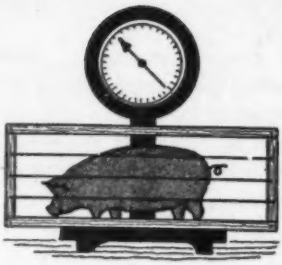
TABLE 1

	LOT 1	LOT 2	LOT 3	LOT 4
Daily Gain, lbs.	2.39	2.25	1.92	1.84
Feed/Steer in Bu. of Shelled Corn	51	27	19	5.0
Corn, Silage, tons	1.71	3.45	4.46	5.95
Carcass Grade	Low Choice	Same	Same	Same
Feed Cost/100 lbs. gain	$16.75	$14.75	$15.54	$15.16
Beef/Acre of Corn Fed (lbs.)	760	1,004	1,193	1,574

TABLE 2

	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
Steer Calves	Small (1)	Low (1)	Excellent (1)	Slow (6)	Negative	Higher than Older Cattle
Heifer Calves	Small (2)	Low (1)	Fair (4)	Slow (5)	Negative	Higher than Older Cattle
Yearling Steers	Med. (3)	Med. (2)	Good (2)	Med. (4)	+ or —	Low
Yearling Heifers	Large (4)	Medium High (3)	Poor (5)	Fast (2)	+ or —	Low*
Heavy Steers	Largest (6)	High (5)	Poor (6)	Fast (1)	+	Low
Plain Cattle	Large (5)	High (4)	Good (3)	Med. (3)	+ or —	Low

*The possibility of heifers being bred increases the risk.



Hog Production Cost Study

Summary of recent research by Purdue economists . . .

Condensed from Agricultural Banker

PURDUE University made a recent study of hog production costs. The results of this study show some interesting facts useful to swine raisers.

1. Purdue economists studied 130 central Indiana hog enterprises for two years. Prices were adjusted to a corn-hog ration of 13.6 to 1 (long-time average) with corn at $1.21 and hogs $16.50.

2. The herds ranged in size from 5 to 120 sows. All were on a two-litter system.

3. Labor was charged at $1 per hour.

4. No allowance was made for possible lower prices on feed purchased in large quantities or possible price premiums on hogs sold in larger numbers.

Findings

1. Lowest costs of production were attained with a sow herd of 50-60 sows. Efficiency improved rapidly up to 30-40 sows with some improvement up to 50-60. Cost per cwt of hogs produced was about $2.20 less for the 60 sow herds than for the 10 sow herds.

2. Total net returns from hogs may increase in herds larger than 50-60 sows. This is mainly the result of volume rather than lower unit costs.

3. Net returns per man hour averaged $2.19. The 10-sow herds returned $1 per hour while the 50-sow herds returned $4.50.

This was the return for direct labor which averaged 27 hours for each sow and two litters. No allowance was made for indirect labor such as time spent in planning, watching the markets, etc.

4. Differences in feed costs was the most important factor accounting for differences in hog production costs. Feed was also by far the largest cost as indicated below:

Feed	66%
Labor	6
Buildings	6

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Machinery & Equipment .. 6
Other 16
Total Costs 100%

5. Feed requirements per cwt of hogs produced (including the breeding herd) averaged:

Corn equivalent ..... 363 lbs.
35% protein equivalent 37
Pig starter 7
Mineral, salt, other 2
Total Feed .....409 lbs.

6. Investment per sow and two litters averaged $440. This varied from $378 for the 60-sow herds to $515 for 10-sow herds. The average for all herds was as follows:

Building & Equipment $237
Feed 78
Breeding herd 70
Machinery use cost 4
All other 51
Total Investment $440

7. Spring pigs were about $15 per litter more profitable than fall pigs. $10 of this was the result of higher selling prices and $5 the result of lower costs.

What Will The Future Bring?

1. A farmer may now maximize profits by maintaining the size of herd which has lowest unit production costs. —Depends on alternatives for operator's labor, price of hogs, etc.

2. Swine enterprises will become larger and more specialized. The size of herd for lowest unit costs will become larger with new technology.

3. A number of the smaller hog enterprises will be able to compete for a long time.

Rear View Mirror Tractor Safety Device

Farm safety specialists describe a rear view mirror on your farm tractor as a "good safety device" in the field as well as on the highway.

A rear view mirror enables the tractor operator to keep his attention on the road ahead and at the same time allows him to view traffic approaching from the rear.

A similar advantage exists in field operations. The operator can keep a constant check on pulled equipment without interfering with steering operations.

Additional highway protection can be obtained by mounting a warning flag on the tractor eight to 10 feet above ground level. The flag should be about 15 inches square. This warning flag can alert an approaching motorist to the tractor's presence in plenty of time to slow down. —*Purdue University*

Crossbreds Are Top Producers

Crossbred cows produced considerably more fat and slightly more milk in first lactation . . .

Condensed from Massey-Ferguson Farm Profit
Lloyd E. Zeman

THE old controversy as to whether crossbred dairy cattle might have an edge over purebred cattle is again causing a great deal of chatter in the cattle breeding world.

New research by University of Illinois and USDA dairy scientists strongly indicates that crossbreeding has at least three definite advantages.

Butterfat production: Dr. R. W. Touchberry, Illinois geneticist and supervisor of the project that has been under way since 1949, told that 42 crossbred cows averaged 11.6% more fat and 2.4% more milk in their first lactation than similar purebred cows. On a lifetime basis, the crossbreds produced 6.3% more fat but 5.8% less milk.

According to Touchberry, the significant increase in production during first lactation may be a reflection of the fact that crossbreds grow faster and are more fully developed than purebreds at relatively young ages at which first lactations are made.

"When you keep in mind that about 50% of all producing cows are either in their first or second lactation, increased production at an early age takes on even more importance," he says. "As cows become older, advantage of crossbreds tends to decrease."

Better livability: In addition to being better producers, the Illinois scientist reports that crossbreds performed better in livability and rate of gain. Of 161 purebred calves born during the experiment, 30 died of natural causes before they were two years old. Only 14 out of 178 crossbred calves died during the same experiment—less than half the purebred mortality.

Although livability probably isn't quite as important in dairy cattle as it is in hogs, Touchberry points out that it can go a long way in increasing dairy herd profits. "It is especially important for the dairyman who raises heifers for sale. The more he can

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Massey-Ferguson Farm Profit, 710 North Plankington, Milwaukee 3, Wisconsin

save, the greater are his profits. And the more heifers raised, the more rigid a culling program can be," he says.

Faster growth: The study shows one of the most significant differences between purebreds and crossbreds is rate of growth. Crossbred calves almost consistently gained faster during the first three years than their purebred half-sisters. After that their rate of gain slowed to less than purebreds so by the time cows were five years old, weight difference practically disappeared.

At 24 months, heifers from Holstein sires and Guernsey dams averaged 145 lbs. more than purebred Guernsey heifers. The offspring of Guernsey sires and Holstein dams averaged 234 lbs. more than Guernseys of the same age. This is 43 lbs. less than the average weight of Holstein heifers.

The dairy cattle scientist points out several advantages to faster growth. First, more rapidly growing animals usually grow more efficiently. And, secondly, bull calves and cull heifers usually reach a given weight and can be shipped to market sooner. Another possible advantage is that heifers may be able to be bred younger since they reach maturity sooner.

Some dairymen and researchers have thought for a long time that there might be benefits from crossing certain breeds of cattle. In 1946 the Bureau of Dairy Industry reported that crossbred cows produced 30% more than their purebred dams. But because of the plan of the experiment the results have been questioned.

The Illinois project appears to be well designed. The men in charge picked 20 purebred Holstein and 20 purebred Guernsey heifers from the U. of Illinois herd and from representative herds throughout the state.

For the first matings, random samples of 10 Holstein heifers and 10 Guernsey heifers were mated to a Guernsey sire and the remaining 10 of each breed were mated to a Holstein sire. The second year, heifers that were first mated to Guernsey sire were mated to Holstein sire and vice versa.

For the third and fourth years, a second pair of proven bulls was obtained. Cows needed to be culled were replaced and the same mating system was followed. A third pair of bulls was obtained for the fifth and sixth years, and again the same mating plan was repeated. With this system, researchers were able to compare hybrid cows with purebred half-sisters, a more reliable technique than comparing just daughter and dam records.

Flattery is like cologne water — to be smelled not swallowed.

Whether or not crossbreeding

is profitable depends on how much you can increase production. And this at least partly depends on the sires available at your breeding association.

For example, say your cows have an average production of 400 lbs. butterfat and the proof of the best bull of the same breed at your artificial breeding association is 450 lbs. If transmission from both parents are equal, the offspring should average 425 lbs. of butterfat.

Now let's say the highest inheritance production record of an available bull of a different breed is 425 lbs. The offspring would have an average production potential of 412.5 lbs. of butterfat—plus an additional 10% due to the hybrid vigor associated with crossbreeding. Since 10% of the production adds up to about 40 lbs. the expected butterfat production of crossbreds is 452.5 lbs., or 27.5 lbs. more than purebred animals.

"If you want to give crossbreeding a try, you can start with the cows in your present herd. But first determine whether the future production of crossbred daughters is likely to be greater than that of purebred daughters. If it is, seek out the best sire available that is of a breed other than the breed of your cows.

"Then mate these heifers to a sire of a third breed and their offspring to a sire of still another breed," says Touchberry. "Once all breeds have been incorporated, you can repeat the cycle by using a sire of the same breed as the original stock."

What does this all mean to the purebred breeder? Touchberry believes it should benefit purebred and commercial producers alike. Purebred sires play a very important role in securing good results in a systematic crossing program. Thus, much of the success will depend upon the breeding progress made by purebred breeders.

Crossbreeding is not a "cure all" and certainly is not a substitute for proper feeding, sanitation and overall good management. Caution needs to be exercised in use. But, when properly used in conjunction with other good management methods, it may be another useful tool in unlocking a future of greater production and increased profits.

HERE'S HOW CROSSBREDS COMPARE*

	PUREBREDS	CROSSBREDS
Butterfat test	4.3%	4.26%
Fat production	368.4 lbs.	411.2 lbs.
Milk production	9360 lbs.	9587 lbs.
Livability of calves	81.4 %	92.1%
Body weight (24 mos.)	889-1166 lbs.	1034-1123 lbs.
Wither height (24 mos.)	123-133 (cm.)	127-130 (cm.)

* All production records are first lactation.

The Breeding Ram — Treat Him Well

The ram is highly important to sheep profits and needs care all year 'round . . .

Condensed from Farming In South Africa
F. O. W. C. Karberg, Agricultural College and Research Institution, Potchefstroom, South Africa

RAMS require careful attention throughout the year and not only during the breeding season — an important aspect which is often lost sight of.

Negligence in the care and management of rams between mating seasons may sometimes be the cause of poor lambing results as well as heavy losses sustained by the owner.

Selection, management, use and age are factors which merit special consideration.

Selection

The potential breeding value of a ram must be known as far as possible. The animal should have no defects as regards conformation, wool (in the case of sheep), fertility, vigor and constitution. These factors form the basis of selection and animals should on no account be selected solely on the grounds of outward perfection.

Management

The ram must be kept in a spacious, properly fenced camp. Daily exercise and movement are essential for the normal health of of rams. Usually most rams in such a camp will get enough exercise.

Some rams are inactive by nature and after they have satisfied their hunger and quenched their thirst, they lie down near the feeding and watering troughs. This may lead to the weakening of the legs, and especially the joints, with the result that later on they can no longer move briskly or render the service expected of them. Such rams should be driven or led a few miles several times per week for the necessary exercise.

The ram camp must be provided with suitable shelters as well as with cement troughs for fresh drinking water. The fertility of rams declines rapidly at temperatures above 90°F, especially under humid conditions. The effect of these conditions may last for as long as eight weeks.

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Farming In South Africa, Department of Agriculture, Pretoria, South Africa

Since rams usually receive supplementary feeding, strong feeding racks and troughs are desirable to limit the wasting of feed to a minimum. A salt trough which protects the lick against the elements, is an essential requirement in the ram camp.

If only one breeding ram is kept, it should be placed in the company of a few young rams. Treat them all firmly yet friendly, and be on the lookout for the playful ram! The foreheads of rams which are inclined to fight, may be covered with a piece of leather so that they will be unable to see one another directly. Sheep soon become accustomed to their normal treatment and get to know the persons who handle or feed them. For this reason strangers, and especially dogs, should not be allowed near them.

Use and Age

Breeding rams must be used judiciously. Full-grown young rams of eight to twelve months may be mated to 20 or 25 ewes. The desirable, useful age, however, is two years. Rams usually remain suitable for four or five breeding years. In large flocks two or three rams may be mated to every hundred ewes. It is not advisable, however, to bring two rams simultaneously to a group of ewes, since it may only lead to fighting and may cause the ewes not to become adequately served. A well-cared-for stud ram may even be placed with a group of 100 ewes.

During the mating period the rams must be constantly watched for vigor and action and also for any irregularities, such as injury or illness. The relief method, according to which one half of the available rams are placed with the ewes, while the other half are rested and well cared for, the two halves being changed every week, yields good lambing results.

A tenth of all milk sold in the U. S. is in the form of cheese.

One must bear in mind that with continuous mating a deterioration of the semen occurs, which is aggravated by hot weather.

Mating time should generally be limited to six weeks.

Where careful records have to be kept, as in stud breeding, hand-serving is the proper method of mating, especially when a particular ram has to be used as effectively as possible.

For better lamb crops, about one quarter of the oldest rams should be replaced by young rams each year. At each mating time the flock farmer will therefore make use of rams with ages varying from two to five or six years. The practice of beginning every fourth or fifth year with a

whole set of new and young rams (some of which may not serve properly during the first mating season) should be avoided.

Furthermore, e s p e c i a l l y in small flocks, where breeding rams are selected from the same flock or rams are used for, say four years in succession, too close inbreeding should be guarded against. Father and daughter mating in particular should not take place.

When breeding rams are purchased, the immediate environment would be the most suitable, but if the rams have to be removed to a different environment, a proper period of adjustment of two to three months should be allowed before service is expected. Avoid as far as possible the driving of rams during the hottest part of the day. Make use of suitable means of transport where rams have to cover long and tiring distances.

A variety of diseases and pests as well as internal and external parasites can adversely affect the fertility and activity of rams. Try to keep the yard, shearing sheds, and general area free from any form of infection. Irritating seeds adhering to the ram's belly or the ewe's back will also impair successful mating.

With proper care and management, good production results and consequently also a fair income, may be expected of a well-bred ram.

Suburbia

The farmer set out apple trees,
And cleared the land to plant his grain.
But changed, again, is the terrain:
It blooms with canvas canopies,
Tiled swimming pools and hobby shops,
With supermarts and parked machines.
On former fields of corn and beans
Now children are the bumper crops!

—Eleanor Phillis in Grain Improvement Notes

U. S. farmers in 1960 paid the biggest farm real estate tax bill on record, a USDA study shows. These State and local taxes, levied in 1959 and payable for the most part in 1960, amounted to $1.2 billion — an increase of 8 per cent over 1958 levies and the sharpest annual rise since 1948. Tax per acre of farmland rose from an average of $1.03 in 1958 to $1.11 in 1959.

Select Diesel Fuel To Save Dollars

Good fuel is the first step in efficient and economical use of your diesel engine on the farm . . .

Condensed from Missouri Ruralist

W. E. Irwin, Caterpillar Tractor Company

BUYING diesel fuel by the gallon is like buying potatoes by the dozen—the value of each depends upon its weight, not its quantity. Yet, it's not likely we'll change the standard unit for dispensing liquid fuels in this country—the gallon.

A more accurate method for measuring the value of the fuel you get would be to pay for BTU content. BTU is the abbreviation for British Thermal Unit, which represents the amount of heat required to raise the temperature of one pound of water one degree. It takes these heat units to produce horse-power. The work content of a gallon of Diesel fuel, or BTUs (heat units) per gallon, is directly proportional to the weight of that fuel. For a given volume, heavier fuels contain more BTUs, or work potential, than do lighter fuels. The typical No. 2 Diesel fuel has 7,100 more BTUs to the gallon than the typical No. 1 fuel. This represents more than 5 percent more work output, and that's not the only gain.

Here's Way To Save Money

Heavier fuels that have more BTUs also cost less. A farm owner who uses 100,000 gallons a year will save $1,000 on difference in price of 1 cent a gallon between No. 1 and No. 2 Diesel fuel. In some areas, the price differential often is several cents. By using the heavier fuel, work output can be increased if the same amount of fuel is used or fuel consumption can be lowered if the same output is maintained.

Fuel weight usually is expressed as a specific gravity or API gravity. Specific gravity of a fuel is ratio of its weight to weight of an equal volume of water at a given temperature. API gravity is derived from an empirical formula and is such that the larger the API gravity number, the lighter the fuel. Do not be misled by API gravity numbers. The higher a fuel's API number, the lower its work capacity.

The weight of fuel oil, or technically speaking, the specific gravity of the oil that represents

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the BTU content, can be measured with a hydrometer—a float with a calibrated scale that is read at the surface of the liquid. Inexpensive, but accurate, hydrometers are available to determine whether a fuel has a high, fair or low BTU content.

Since temperature affects a fuel's gravity and volume, large volumes of fuel should be purchased at some standard temperature, usually 60° F. Other temperatures can be used so long as the temperature corrections are known. As an example, 10,000 gallons of fuel at 80° F. is 9,920 gallons at 60° F.

The responsibility of getting the most economical fuel from the supplier rests with the user. A hydrometer should be used to check each batch of fuel purchased to assure full benefit. Every Diesel engine user owes it to himself to get the most for his fuel dollar while staying within the framework of the engine builder's fuel specifications. Know what you are buying. Shop around if necessary to purchase fuel that best meets the needs of your engines and is easiest on your pocketbook. Fuel suppliers will co-operate as they want to serve the market to the best of their abilities.

TABLE

Weight Fuel Lb./Gal.	Heat Value BTU/Gal.	Sp. Gravity at 60° F.	Gravity Deg. API
6.79*	134,700	0.816	42
6.95	137,000	0.835	38
7.29**	141,000	0.876	30
7.48	144,300	0.898	26

* Typical No. 1 Diesel fuel.

** Typical No. 2 Diesel fuel or furnace oil.

Nature Lays Down The Law

If we wish to preserve our present way of life we must come to terms with what is left of natural forest, soil, water, and wildlife, and it will be on terms laid down by nature, not imposed by us. Any wrong which nature may for centuries commit, she has centuries to repair, but we, whose days are short, must walk warily less we become the victims of the wasteland we make.

—The Royal Bank of Canada Monthly Letter

Here's How You Can Make High Quality Grass Silage

These techniques for making good grass silage apply whether you put it in a trench or an upright silo. Spreading evenly and packing will cut down spoilage . . .

Condensed from Wisconsin Agricuturist

GRASS silage offers three main advantages over making dry hay.

First of all, the average farmer will save more protein and carbohydrates when he goes to grass silage. One estimate figures that the saving will equal the protein in 400 pounds of linseed meal and the carbohydrates in 16 bushels of corn for every acre of forage harvested.

Second, ensiling will improve the palatability of the crop, and it may save a crop that might be lost. Wet weather at haying time can mean poor hay. But there's more chance to get the crop in the silo without rain on it than there is of getting it into the mow.

The third advantage is convenience. Moist forage that goes into the silo isn't dusty like dry hay. And it's less work to handle bulk forage than to tote bales around.

Grass silage isn't a cure-all, though. Cows will eat better when they have some dry hay along with their grass silage. And sun-dried hay is an important source of vitamin A .

Grass silage is heavier than hay for the same amount of feed. This means more work when the feed is handled without machinery.

Get Machinery in Top Shape

The first requirement for good grass silage is a strong tight silo. Either upright, bunker or trench silo will do if the silo is in good condition. Some silos will need extra reinforcing to make them strong enough for grass silage. A concrete stave silo that is leaky can be fixed up with cement sprayed on the inside by a com-

Reprinted by permission from Wisconsin Agriculturist, Racine, Wisconsin

mercial operator. Horizontal silos will have more spoilage than an upright silo, but they cost less to build.

Good machinery is essential, too. The extra weight of the green forage over dry hay means that wagons should be in top shape. There's more chance of tire failure and other wagon breakdowns in making grass silage than in making hay. In a 7 by 14-foot wagon box it takes only a foot of green forage to make a ton.

The best quality grass silage is wilted to 65 or 70 percent moisture before it goes in the silo. More moisture means seepage—less moisture means the silage may heat.

At 70 percent moisture silage will need a preservative. Anything

The price of U.S. farm land increased 250% from 1910 to 1960.

that contains acid or sugars or starches that will ferment into acid will do. Some work has been done with different acids as preservatives, but the average farmer will get along better with sugars or starches.

Molasses is an easy preservative to use. The molasses is pumped out of the drum and on to the green forage just before it's blown into the silo.

Grains provide the starches which ferment into acids. If there's some corn left over from last year, it will make a first class preservative. Oats, barley, wheat, or other grains will work, too.

One big advantage of adding grain to the grass silage is the improvement in feed value. Cows often lose production when they are first switched to grass silage. The extra carbohydrates in the grain may reduce or eliminate this slump.

At 65 percent moisture silage should not have any grain added. It's too dry for this type of preservative. It's all right to add some acid, but it's not needed at this moisture level.

Using The "Squeeze" Test

The practical way to check the forage for moisture is by feeling of it. If the forage is to go into the silo without a preservative, there's a simple test for moisture. Chop a little to a ⅜ or ½-inch length. Then take a handful and squeeze it into a ball. If juice runs out when it is squeezed and it stays in a ball, the forage is too wet.

If the ball breaks up at once and falls apart completely, the forage is too dry. Ideally, the ball should expand slowly and break apart into several pieces.

This test should not be run until the stems are wilted enough so that they don't break when twisted. But the leaves should not be dry yet.

It generally takes only two or

three hours on a sunny day for legumes to wilt down to the right moisture. Cloudy weather means a longer wait. Good grass silage can't be made in the rain, but it can be made in the stretches between showers. If the weather is good after chores are done in the morning, chances are that a good bit of silage may be put up by noon.

When filling the silo, it's important to spread silage evenly and pack it well. A sloppily filled silo may tip over from too much weight on one side. A poor packing job means more air in the silo—and more spoilage.

If conditions permit, it's a good idea to fill the silo without much interruption for any great length of time. Silage exposed to air spoils rapidly. Long delays in filling the silo mean layers of spoilage.

A little advance planning is a big help in working out harvesting and feeding systems to include grass silage.

Cows do best when they have dry hay as well as grass silage for feed. But don't knock off filling silo to make hay when a silo's partly filled.

The general procedure is to put up grass silage from the first hay cutting, and make dry hay from the second. This is because the first crop is generally coarser than the second cutting.

Put The First Crop in the Silo

Another thing you can do is make some grass silage for summer feeding. A silo can hold grass silage for a while in the summer, and then be ready for corn silage or wet shelled corn later on. In the meantime you have some high quality forage to feed the cows when the pastures dry up in the summer.

The last thing to do after the silo is filled is to seal the top. The first couple of feet may spoil, so it will pay to chop weeds or something that isn't worth much, such as wet straw, to cover the top. Then put building paper or a layer of plastic on top of this and weight it down.

Finally, a safety pointer. Silage may create some dangerous gases. Before entering a partly filled silo, or one that has settled, run the blower for 15 mintes or more to get rid of the carbon dioxide gas.

A cow producing 14,000 pounds of milk is twice as profitable as a cow producing 10,000 pounds and three times as profitable as a 7,000-pound cow. With 18 cows averaging 13,000 pounds, returns are as great as with 54 cows averaging 7,000 pounds.

—*Kansas Farmer*

If New Highways Hack Your Farm

What you can and can't do about it . .

Condensed from Farm and Ranch

Richard E. Geyer

HIGHWAY construction is off to a boosted start that will likely carry it full speed through the sixties.

Some 730,000 landowners will be asked to yield over a million acres of land for an estimated 30,000 miles of Federal Interstate highways planned for this decade.

Most of these roads will be laid down on new locations in rural areas—over 80% in Tennessee, Virginia, Kentucky, Florida and Louisiana, for example. And you may see a *state* highway go through your farm.

If a highway comes to your community, you will want to know:

How much land will they take? As much as 40 acres per mile for six-and eight-lane superhighways. Interchanges take an additional 40 or 50 acres. One farmer lost 8 of his 45 acres, has 33 of the remaining 37 acres split off from his farmstead.

Can I enter the new highway from my county road? Not if it is limited-access, as all Interstate highways are. Only entrance is by main roads, spaced 20 to 30 miles apart. In a few cases in-between-entrance via service roads or intersections is provided in sparsely traveled areas. If your farm is split, chances are slim for an underpass for your machinery and livestock, says W. F. Patten, veteran Toledo farm appraiser.

How is the land taken? Your state highway department or commission plans and acquires land for all Interstate and most state highways. The route, location of interchanges and other details are based on studies of factors such as traffic patterns and economic effects on the community.

Location established, the department will appraise land needed. Then a state agent will stop by to tell you the amount. He may itemize damage and discuss the offer. If you reject it, the state can condemn and take the prop-

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erty under the law of eminent domain. A court will then decide the amount of the payment, but in many states construction can proceed before the final decision is given.

Can I keep the highway off my land? Only if you can prove that a different route is better for all concerned, or that the highway is not necessary in the first place. With sufficient evidence, you may be able to make changes in such features as access, drainage provisions and location of overpasses and interchanges.

How do I go about changing the highway department's plans? First, find out all you can about the proposed highway. Highway departments are supposed to keep you informed, but don't wait. See your county engineer, county highway committee or district office of the state highway department. Watch for newspaper notices.

Learn about the proposed location, access restrictions, where overpasses and interchanges will be located, the width of the right-of-way, suggests Raymond D. Vlasin, U.S.D.A. economist. Then, if you disagree with anything, organize your neighbors. Move rapidly, because changes will be considered only while plans are in the preliminary stage.

You can express your viewpoint on an Interstate highway at a locally held public hearing. The state will explain highway plans, answer questions and record complaints. Warning: public hearings may not be required for proposed *state* highways, or for widening any highway.

If you want a change, burden of proof is on you. Expect to spend time, as well as money for the appraisers and engineers needed to provide proof.

Is it worthwhile? Vlasin reports that a group of Wisconsin farmers combined to change the path of a highway to a location that meant less loss for themselves and the entire community. Another farm group worked with local businessmen to change location of an overpass. The job can be done.

How much will I be paid? The U.S. Constitution guarantees payment for property taken, but does not specify the amount. You will be reimbursed for (1) land and improvements taken, and (2) damage to remaining property, although both categories may be handled as one package.

The island of Ouessant, off France, has winds so strong that haystacks need to be roped down, slate roofs cemented on, and piles of stone scattered over pastures to provide shelter for sheep.

You can usually keep buildings

if you like, and may be paid moving costs.

For what specific damages will I be paid? Compensation has included:

- Extra traveling expenses if your farm has been divided.
- Damage to crops, trees, shrubbery, springs and wells.
- Loss of privacy.
- Inability to make most advantageous use of remaining land.
- Effects of drainage, either natural or artificial. According to Patten, highway departments must either fix drainage the way it was or pay damages. If the department promises to restore your drainage system, get it in writing.

The new highway will divert customers away from my roadside market. Can I get reimbursed? No. Same goes for inconveniences, fumes or noise due to traffic and other hard-to-evaluate claims.

How can I assure fair payment? Here are suggestions:

- Accompany the state appraisers when they visit your farm. "If you give convincing evidence that they have missed something, they may change their estimates," Patten says.
- Study the state's offer carefully. Try to anticipate damages, since extra payment after you have signed the state's contract is unlikely. Visit farms that have had highway experience. On some, for example, fresh soil has eroded into drainage systems from overpass enbankments. Landowners had not forseen this damage.
- Compare your offer with your neighbor's for equal treatment.

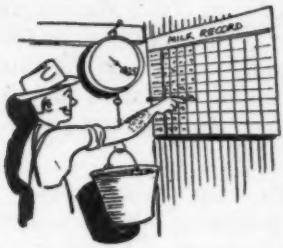
If you question the state's valuation, have an experienced local appraiser make an estimate. State appraisals are usually adequate, Patten says. But guard against the exception.

- If your appraisal is higher than the state's, try to negotiate for a better settlement. Some states, however, have a one-price policy and won't allow any "horse-trading." If your property is condemned, the jury will decide the payment on basis of court appraisal, and evidence you and the highway department submit.

Does it pay to go to court? "The jury is virtually always on the land-owner's side," Patten contends. There is some risk, though, because courts have in a few cases awarded less than the original offer. Also, there is the lawyer's fee, although some will take a percentage of any gain as their fee.

How can I make adjustments? You may be able to buy land that has been split from farmsteads that are now on the opposite side of the highway. Trades have been arranged. "Adjustments are usually worked out, but it may take some time," Patten advises.

Time To Change From Fat To Milk Solids?



Many believe that amount of protein and other solids in milk should share spotlight with butterfat . . .

Condensed from The Progressive Farmer
Pete Head

THE modern housewife has a different impression of food needs from those of her mother, when she steps to the back porch to pick up the morning's milk.

Her husband is doing less strenuous work than Daddy did, so needs less-energy-producing (fat) foods. And she is almost certain to be watching her waistline. The children need protein, minerals, and vitamins for their active, growing bodies. And yet milk pricing formulas still contain butterfat differentials, and we select cows on fat production.

A number of dairy leaders like Dr. R. E. Erb of Washington State College think it's time to take another look at what besides fat is in milk. Said he to the 92nd annual meeting of Jersey breeders: "Perhaps the time has come to pay for milk on total composition, and to find out what consumers want in milk."

Dr. Erb sees on the horizon a possible new pricing system for milk. And with it, no doubt, will come new goals and yardsticks in dairy cattle breeding. This is not without precedent. Four years ago 73 dairy plants in the Netherlands began paying for milk on the basis of its protein as well as its butterfat content.

For more than a decade researchers have sought rapid field tests for determining the nutritive value (total solids) in milk. Golding's bead test for milk solids, and the Orange G dye test for milk protein, are now being used in some areas. Both are used in Washington's DHIA program. Dairymen with herds on DHIA test in Washington now know new things about individual cows. In addition to milk and fat yields of each cow, they know the protein and total solid content of her milk. They're accumulating information to guide future breeding programs.

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The Progressive Farmer, 821 North Nineteenth Street, Birmingham 2, Alabama

Milk Composition Varies

Breeding, feeding, age, stage of lactation, and season all affect milk composition. When studying milk composition of daughters of Holstein and Jersey sires, Dr. O. T. Stallcup, University of Arkansas, found: 1) solids-not-fat in milk of daughters of Jersey sires ranged from 9.34% to 9.64%; 2) solids-not-fat in milk of one Holstein bull's daughters was 8.55%. For daughters of another bull percentage was 8.72. These studies, like others, indicate that solids-not-fat in milk vary within breeds, as well as between breeds.

Will milk composition change in the next 25 years? Yes, if the present emphasis on total solids continues. Breeding and management have brought these changes in the past 60 years:

Breeding Can Boost Solids

"If we select and breed for protein content, after 19 years we could expect the protein content to be increased by 0.28%; fat, 0.48%; solids-not-fat, 0.37%; and total solids, 0.85%," says Dr. C. M. Von Krosigk, Heisdorf and Nelson Farms, Inc., Washington. Only by putting emphasis on total solids could we increase the nutritive value of milk faster. And this would give more fat and less protein in milk.

In the early "butter days," a cow's producing ability was recorded in terms of churned butter. These were usually seven-day tests. Although not too accurate, dairymen used these records as breeding guides. First systematic collecting of Jersey cows' records was by Maj. Campbell Brown, Maury County, Tenn.

Higher Milk Production Stressed

With World War II, repeal of the oleomargarine tax, and federal milk marketing orders, came new pricing formulas and changes in consumer demands. Milk was no longer priced solely on its butterfat content, so dairymen turned their attention to milk production as well as fat. The American Jersey Cattle Club in 1952 added milk production requirements to its Superior Sire program. A year later the Guernsey Cattle Club published class leaders in milk

FATS AND SOLIDS-NOT-FAT CONTENT OF MILK

Breed	1900 - 1925 Per Cent Fat	1900 - 1925 Per Cent Solids-Not-Fat	1926 - 1957 Per Cent Fat	1926 - 1957 Per Cent Solids-Not-Fat
Jersey	5.08	9.08	5.51	9.49
Guernsey	4.94	9.06	4.99	9.32
Holstein	3.41	8.56	3.49	8.61
Ayrshire	4.02	8.80	4.15	8.96
Brown Swiss ..	3.62	8.87	4.02	9.39

production. Total milk, and not just fat, was in the spotlight.

USDA inaugurated its Weigh-a-Day-a-Month recordkeeping system in 1956. Thousands of dairymen are now using it to watch milk production on their cows.

"The dairy industry needs to take a positive approach," says Stanley N. Gaunt, member milk solids committee, American Dairy Science Association. "Milk should be sold on a positive basis—on its most valuable nutrients, especially protein. And we can make a strong case for testing and selecting cow on milk protein content."

In future breeding programs, it would be well for dairymen to put more emphasis on milk and protein, or total solids. Guernsey and Jersey breeders could well disregard fat percentage. But with other breeds, especially Holsteins, breeders should discriminate against cows and families that fall below the breed average in fat percentage.

Chickens Never Too Sleepy To Eat

Chickens apparently never get to sleepy to eat! Put feed in front of them, keep the lights on, and they will eat right around the clock.

The chicks' 24-hour appetite, stimulated by continuous lighting, and satisfied by continuous eating, produces faster growth, faster feathering, and a higher degree of market finish than birds under normal lighting conditions.

These research findings have proved to be a boon to both poultry producers and consumers. For the consumer, the findings have helped make broilers even more of a special delicacy and without any increase in market prices. It has meant broilers that are more plump and more tender than usual and especially adapted to charcoal cookery, indoors and out.

A shift of many fryer producers to continuous lighting and feeding has shortened the average feeding period. The faster daily weight gains cut 7 to 10 days off the feeding period and send birds to market after 8 weeks instead of 10.

On a yearly basis, this means a saving in time of from 4 to 6 weeks and means poultrymen are now able to raise 5 batches of broilers instead of 4 per year. It also means less labor per batch of broilers, and thus lower production costs.

—*Washington State University*

Combination of Factors Causes Cow To Bloat

Wisconsin researcher finds pressure build-up is caused by inability to belch during rapid gas production . . .

Condensed from Nebraska Farmer

RESEARCH by a University of Wisconsin veterinary scientist shows that the cause of bloat can't be pin-pointed definitely.

The disease isn't caused by faults of the feed alone, the animal itself or the digestion in the animal's paunch.

Rather, cows bloat because a combination of factors is right for development of the disorder, R. E. Nichols says.

And if there's no simple cause, there is probably no simple cure, Nichols concludes. But he thinks scientists could recommend better procedures for preventing bloat if they knew more about the chemistry, bacteriology and physics of ruminant digestion.

This disease centers in the cow's first stomach, called the rumen or paunch. This is a large organ in which microorganisms and a few digestive enzymes work on the cow's feed—particularly on roughages—until the material is ready for further digestion in the animal's other three stomachs and intestines.

Nichols' research for the past several years has been aimed at learning more about what goes on in the rumen — particularly the biophysical aspects of the process.

These studies lead him to believe that too much frothing of the rumen prevents escape of gases formed during digestion. Normally, a cow belches to get rid of gas that starts to build up too much pressure in the paunch.

Froth Covers Controller

Research has shown that a cow's belch is controlled by a "belch control zone" up near the

Reprinted by permission from Nebraska Farmer, 1420 P Street, Lincoln 1, Nebraska

front of the rumen. If this belch controller is covered with froth, the cow can't use this normal process and trouble begins.

To demonstrate how this happens, Nichols pumps gas into the rumen of an experimental cow or sheep. A gas-filled animal belches more often than it normally would and so gets rid of larger volumes of the gas.

When Nichols fills a cow's rumen with water to cover the belch control zone, the cow doesn't belch. This doesn't harm her unless the rumen organisms are producing gas steadily and rapidly.

So, Nichols says, it seems that a necessary condition for bloating is inactivation of the belch control zone of the rumen. Observations show that this is usually caused by frothiness of the rumen contents.

This led the veterinary scientist to look further into the cause of frothing in the rumen. After detailed studies with cows that had rumen openings, with tests of rumen juice and plant juices in laboratory glassware. Nichols has a pretty good picture of the physical forces which contribute to frothing.

To produce froth, there must be enough of the right kind of material in the rumen to provide for rapid and long-time gas production by rumen microorganisms. But probably even more important is that normal rumen contents have to change in such a way that the material traps more of the gas bubbles as they're produced. This bubble entrapment is the cause of excessive frothing.

The rate of frothing is determined by how fast bubbles are formed, the number of bubbles formed, how rapidly they rise to the surface, the nature of the bubble skin and several other things, Nichols found.

If conditions are right, the froth breaks up just about as soon as it's formed. But if changes slow up bubble breaking and bubbles joining with each other—and the rumen contents are more viscous—then the froth is "stable" and breaks up more slowly than it is formed.

One half of knowing what you want is knowing what you must give before you get it.

These laboratory observations are borne out by observations on rumen contents of cows which have been fed bloat-provoking fresh legumes, Nichols says. He has found that the rumen contents becomes less dense (so are less able to support bubbles and food particles in floating position).

They also become more viscous. Viscous liquids such as molasses

slow down the rise of bubbles through the material in comparison to a less viscous material such as water. Nichols says the increased viscosity is probably the most important single factor bringing about excess frothing. The increased moisture is bound up within the solid material rather than as free liquid in the rumen.

Tough Barrier

Surface tension is also greater. There's a tougher barrier for the bubble to break through to escape from the rumen liquid.

In a bloating cow, the rumen contents contain a larger proportion of solids than in normal cows, and bubbles are formed faster. The rumen contents are more acid than is normal. The bubbles tend to stay where they are formed—they rise through the rumen contents more slowly and don't join with each other to form larger bubbles.

Net effect is that more bubbles are trapped in the rumen contents, and gas activity increases in the lower part of the paunch.

All these things finally build up gas pressure in the rumen. If the pressure becomes too great for any length of time, the cow dies of suffocation.

How To Tell Danger Temperatures of Stored Hay

It is no longer necessary to guess at the fire danger of a hay-mow filled with damp hay. Researchers have worked out the following table of temperature danger-signals.

Take the temperature reading at various depths below the surface with a thermometer attached to the end of a pipe or rod. Any reading below 120 degrees F. is not dangerous. Higher readings than that are unusual, and warrant close observation. Take the following steps if you find the hay temperature above 120 degrees:

150 degrees—Your hay is entering the danger zone.

160 degrees—Prepare to remove hay. Automatic alarm will sound if you have one installed.

170 degrees—Maintain constant vigilance. Look for hot spots.

175 degrees—Keep all door openings closed. Expect hot spots.

180 degrees—Call fire department for standby service. (Also notify insurance man).

190 degrees—Remove animals and tools. Remove hay. Be extremely careful. —*Sinclair Farm and Home Book*

A Promising Face Fly Control

Organic phosphorus insecticides may also aid in controlling horn, stable, and houseflies . . .

Condensed from Agricultural Research

NEAR-PERFECT control of the bothersome and widespread face fly has been achieved —in the laboratory—by adding a small amount of some insecticides to dairy cattle feed.

Experiments show that certain organic phosphorus insecticides pass, largely undigested, through cattle and make their manure highly toxic to face fly larvae. These larvae develop only in fresh manure. This research was conducted at USDA's Agricultural Research Center, Beltsville, Md. Similar studies there indicate this method also may aid in controlling the housefly.

At Corvallis, Oreg., in research headed by ARS entomologist G. W. Eddy, scientists earlier found that some insecticides might help control the hornfly, stablefly, and housefly breeding in manure. Results of these studies, during screening of various insecticides for use as systemics, encouraged the research at Beltsville.

Although no insecticides have been approved for this use (questions concerning residues in meat and milk aren't completely answered), scientists consider the results timely and significant.

The face fly has become a troublesome cattle pest in the U.S. and is continuing to spread. Since being found in New York in 1953, the insect has infested nearly all areas east of the Mississippi River and north of Tennessee and South Carolina. During 1960, face flies were found for the first time in Iowa, Missouri, Connecticut, Maryland, Tennessee, and North Carolina.

Holstein Heifers Were Fed The Insecticides for 5 Days

At Beltsville, entomologists D. W. Anthony and Otelia Bodenstein, and dairy husbandman N. W. Hooven, fed three insecticides —separately in a grain ration—to Holstein heifers for 5 consecutive days.

Insecticides tested were: ronnel (O,O-dimethyl O-(2,4-5-trichlorophenyl) phosphorothioate), Co-Ral (O,-(3-chloro-4-methylumbelliferone) O,O-diethyl phosphorothioate), and Bayer 22408

Reprinted from Agricultural Research, Agricultural Research Service, United States Department of Agriculture, Washington 25, D. C.

(O,O-diethyl O-naphthalimido phosphorothioate).

Manure collected from the animals was then infested with newly hatched face fly larvae. Few larvae survived after cattle received daily dosages of only 2.5 milligrams (mg.) of ronnel per kilogram of bodyweight, or 0.5 mg. of Bayer 22408 or Co-Ral. (One milligram per kilogram is equivalent to 0.0016 of an ounce per 100 pounds of bodyweight.)

In the Beltsville experiments, partial control of the housefly resulted when the insecticides were used at the low (2.5 and 0.5 mg.) dosage rates. At double these rates, control approached 100 percent.

It's Possible That Smaller Dosages Might Work

Minimum effective rates weren't determined for the insecticides tested. It's believed, however, that even smaller amounts might effectively control the face fly.

Relatively few organic phosphorus insecticides have been screened for this type of control. Most research is needed to learn which chemicals are most effective, safest to use, and least expensive.

When these chemicals are found, it's possible minute quantities may be mixed into salt licks. Then the face fly could be controlled most efficiently. But community effort would be needed for maximum benefits.

Insecticides might not be the only control. The face fly has existed many years in Europe without becoming a serious livestock pest. A possible explanation is that parasites and predators may help control the fly.

Dung beetles (Scarabaeidae) may be a factor in control, since these insects break up, burry, or destroy cattle droppings. An intriguing method of biological control might be the introduction of dung beetle species adapted to areas of serious infestation. Or we might introduce parasites that develop in the larvae or pupae.

Prior to the introduction of parasites or predators, however, research would be necessary to make sure they wouldn't harm man, animals, or plants.

The face fly resembles a large housefly. It bothers cattle and horses by feeding on the mucus of the eyes, nose, and mouth, and on open cuts. There has been no evidence of this pest attacking sheep, goats, or swine at Beltsville.

Improved systems of poultry breeding are paying big dividends in more efficient egg production. Thirty years ago, the average hen in the United States laid 121 eggs a year. Today, she's laying 206 eggs a year.

Select The Right Foundation Cows

Building a better herd through breeding is a challenging assignment. These ground rules can help you.

Condensed from Checkerboard Service

Based on an interview with *Dr. George R. Barrett,* Superintendent of Advanced Registry Department, The Holstein-Friesian Association of America, Brattleboro, Vermont

DO you have a yen to dairy with more cows . . . or better cows . . . or just different cows?

You may be hesitant about taking the first step, because selection of good foundations in any breed isn't easy. If your cows are unrelated grades, there's a better-than-average chance of improving your herd simply by purchasing individuals with outstanding records.

On the other hand, you may be planning a long-range herd improvement program and will need cows capable of transmitting capacity for high milk production to their progeny.

"The bull is half the herd" is an old saying in the dairy circle. But Dr. George Barrett of the Holstein-Friesian Association of America believes that emphasis also should be placed on the selection of cows, which are half of every calf. He has made several concrete suggestions for dairymen to follow when choosing foundation cows.

Size

The size of the cow is influenced by heredity and feeding, particularly in the heifer-growing stage. A big cow usually has greater roughage capacity, overall strength and vigor than her smaller sisters.

You should buy cows larger than the ones you already own. A good big cow in any breed will usually be a more profitable producer than a good little cow of the same breed.

Another point to remember is that the beef value of a dairy cow is almost entirely determined by her size. The price that you receive for such a cow when her working days are over can go a long way toward purchasing her replacement.

Feet and Legs

Cows with well-rounded feet, straight legs and strong pasterns

Reprinted by permission from Checkerboard Service, St. Louis 2, Missouri

can graze more comfortably than lame cows, and cow comfort is reflected in milk production. Few cows justify the care and expense required to keep them, even for breeding purposes, once their feet go bad. Like size, good feet and legs are inherited characteristics.

Udders

"Look for good-quality udders with strong attachments," advises Dr. Barrett. "Uniformity is important, too, and I would be critical of udders that are wide in front and have large front teats, because they are difficult to milk by machine. A dairy animal with a level rump is more apt to have a good udder," he adds.

Dairy Character

A dairy cow should possess the strength, vigor and ruggedness to finish her lactation in good condition. Nowadays, there's a tendency to avoid extreme dairy character or excessive refinement that may lead to weakness under practical farm conditions.

Body Capacity

Good spring of rib; a big, capacious barrel; and plenty of width between the front legs are signs that a cow can handle large quantities of roughage. Usually, broad-muzzled cows are the best feeders.

Disposition

"Modern-day cows must be able to withstand severe environmental stress brought about by mechanization. Temperament, an inherited characteristic, will become a greater and greater factor in selection.

"Soundness and long life as well as a rugged constitution are also important considerations in the selection of herd foundations," continued Dr. Barrett.

These sound principles apply to any dairy breed. Through proper selection you can upgrade type and production of your herd for greater dairy profits.

Pasture For Sows Not Enough

The swine producer is interested in feeding the breeding herd as economically as possible so long as good nutrition is not sacrificed. It is common practice to hand-feed sows a limited amount in order to prevent over-fatness and reduce feed cost. Good quality legume pastures are valuable for pregnant females because of the protein, vitamins and minerals provided. Pasture alone, however, is inadequate, and the feeder must provide some concentrates to obtain large, strong litters.

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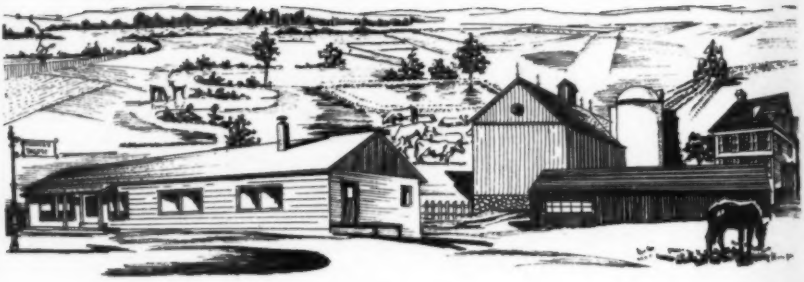

Here's a sketch of our farm where we publish Farmer's Digest. Our 200-acres are planted to corn, alfalfa, grass and trees. We farm — and we publish our magazine on a farm — because we believe that's the only way we can know what other farmers want to read. Farmer's Digest is probably the only farm magazine in the world published on the farm by farmers.

These Are Nitrate Poisoning Dangers

Wet hay and silage can cause trouble at any time of the year . . .

Condensed from The Farmer

NITRATE poisoning was first known in the U. S. in 1937 when it was called "oat hay poisoning."

It has since been discovered that wheat, corn, barley, sorghums of all types, many pasture grasses, and several common weeds also have a tendency to store nitrate under drouth conditions.

It is unknown to many persons that these plants may remain dangerous even after they have been made into hay or silage.

Although called "nitrate" poisoning, the nitrates are relatively non-poisonous when compared with nitrites and it is actually the reduction of nitrates to nitrites that causes trouble. The nitrites are easily absorbed from the digestive tract and combine with the hemoglobin of the blood to form methemoglobin. This compound interferes with the oxygen-carrying capacity of the blood so that cattle may suffocate while showing symptoms much like those of prussic acid poisoning or corn stalk poisoning.

It is well known that some plants contain a substance which under certain conditions is able to reduce nitrates to nitrites. This fact may explain some mysterious cases where previously harmless forages suddenly became poisonous.

Experiments have shown that even a palatable and good quality oat hay that is moistened with rain or snow and then exposed to air may contain d a n g e r o u s amounts of nitrites within a short time.

The change from nitrates to nitrites requires about a day after forage has been wetted. Poisoning following such wetting is only possible when the forage already

Reprinted by permission from The Farmer, 55 East 10th Street, St. Paul 1, Minnesota

contains a considerable amount of nitrate, of course.

Animals Stagger, Froth

When animals are severely poisoned the symptoms are those of suffocation, including panting, staggering and frothing at the mouth. Animals may urinate frequently, bloat, kick at the belly, or die suddenly. In milder cases no such symptoms may appear at all. Instead, trouble is indicated by such things as the abortion of dead, full-term calves, or decreased milk production and loss of weight. Many animals showing these mild symptoms will have a history of sore feet, lameness, and spells of being off feed suggestive of hardware trouble. It has also been reported that rations containing more than 1.5% of nitrate will often cause breeding troubles.

On the Island of Aran, in the North Sea, the farmers use stone fences, but no gates. They 'open up' a wall anytime they need to move stock or tools.

Although a definite diagnosis is often hard to make when only the symptoms are considered, certain characteristics of blood may help to tell nitrate poisoning from prussic acid poisoning and corn stalk poisoning, two ailments which greatly resemble it.

Nitrate—Fresh blood has a chocolate-brown color.

Prussic Acid—Fresh blood has a peculiar cherry-red color.

Corn Stalk—Heating a blood sample until it clots and then letting it cool will cause it to turn a bright pink color.

The success of treatment is largely dependent on the amount of poisonous material eaten, but the intravenous injection of methylene blue will help if anything will. As an alternative, methylene blue tablets or sodium thiosulfate preparations may be given orally. Doses of mineral oil may help to counteract the caustic action of nitrate salts, and drenching with vinegar has a chance of proving beneficial. In the case of range animals, quiet and rest will probably do more good than treatment of any kind which is pretty sure to frighten and upset the animals.

Prevention is entirely a matter of keeping dangerous feeds away from cattle. With this in mind, there will be times when it will be desirable to check certain plants for evidence of poisonous qualities. Testing materials are available through veterinarians, either in the form of tablets or solutions.

If nitrate is present, a blue color develops when the reagent comes in contact with the test material. The depth of color and the speed of a reaction helps to indicate the amount of nitrate that is present.

Herd Size and Conception Rate

Large herd owners must check for heat more carefully this New York study shows . . .

Condensed from Tri-State News
H. Joe Bearden, Cornell University

HAS the size of your herd increased appreciably during the past few years?

If so, you probably have experienced a decrease in conception rate. A recent study of New York dairy herds shows that herds with 10 to 30 cows have a 5 per cent higher conception rate than herds with 60 or more cows.

The following table summarizes the data collected from 4,537 New York dairy herds.

No. Cows In Herd	% Non Returns	No. Herds
10-19	70.5	1578
20-29	70.3	1335
30-39	69.4	808
40-49	68.3	411
50-59	67.6	185
60+	65.6	226

Timing

The difference in the conception rate for the various size herds probably is due largely to timing of breeding. As the herd size increases the dairyman has less time to devote to each cow. He is usually busy doing other chores and does not take sufficient time to observe his cows though he may turn them out daily.

Some dairymen have to rely on hired help who do not always have the interest in the herds that the owners have. This can add appreciably to the problem of "catching" the cows in heat at the proper time. For best results, place your call when cows are in standing heat.

Recommendations

As the size of the herd increases it is even more essential to turn cows out to be checked for heat. All cows should be turned out in the morning and watched for at least one-half hour. If the herd is larger than 50 cows it may be profitable to turn the cows out in two smaller groups.

The cows which have not been bred since calving and those

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which have not been diagnosed pregnant should be turned out again in the afternoon.

With the larger size herds it may be profitable to provide a sheltered area in which the cows can be checked during bad weather conditions.

An Invitation From Africa

Dear Editor:

Perhaps one of your readers would be interested in corresponding with a young man who is a farmer and agricultural assistant. He lives and works in British East Africa, speaks English and has a vast admiration for the American farmer.

This young man contacted me through a mutual friend and asked please could I find a "real American farmer" who would be willing to write to him.

As I do not know any real farmers (we just putter around here in California) I am asking you this favor. Those who take the time and trouble to write will gain great personal satisfaction. Contrary to some of the news we hear, the average African has a great respect for all Americans.

His address is:

Mr. Akisoferi Beteremo
Nambale, Butiver
S. Bugisu
P. O. Box 84
Mbale, Uganda
British East Africa.

Thank you very much.

Sincerely,
R. J. Williams
Glendale, California

Farmers today are getting 76% more nutrients per ton of mixed fertilizer than they got about 30 years ago. Back in the year 1929, the average of the three primary nutrients—nitrogen, phosphate and potash—in mixed fertilizer, was 17.6 units. In 1959, the average was 31 units. This trend toward higher analysis fertilizer helps explain why prices of plant food have remained relatively low over the years.

Swine Program Produces 200-Pound Pigs in 5 Months

Iowa State University

A SWINE program developed at Iowa State University gets pigs to 200 pounds in 5 months with 3 pounds of feed per pound of gain. Animal Husbandman Virgil W. Hays reports that the test pigs averaged 200 pounds at 146 days of age. Some individuals came off the test weighing 200 pounds at 130 days of age.

The 324 pigs averaged 20 days of age and 12 pounds of body weight at weaning. They were reared in confinement on three different rations. All pigs were fed a starter ration for the first 6 weeks after weaning, a grower diet for the next 6 weeks, then a finisher ration until they reached market weight of 200 pounds. The finishing period also required an average of 6 weeks. Each ration was prepared to supply the pigs' needs for each growth phase involved.

At 56 days of age the pigs averaged 40 pounds and were gaining at the rate of 1.2 pounds a day on an economical ration. They weighed 46 pounds at the end of the starter phase.

During the 6-week grower phase, the pigs gained 1.7 pounds a day on 2.9 pounds of feed per pounds of gain. They averaged 117 pounds at the end of this period.

During the finishing phase, the pigs averaged 1.95 pounds daily gain on 3.6 pounds of feed per pound of gain.

Over the three feeding periods, 20 to 146 days of the pigs' lives, the pigs grew at an average rate of 1.5 pounds per day on 3 pounds of feed per pound of gain.

Hays explained that the three rations differed mainly in the protein level and amount of vitamin and antibiotic fortification.

A young pig grows at a faster rate and has higher nutrient needs than an older pig, he added. So, it's important that the ration is formulated for a given stage in the pig's life cycle. A ration that's adequate for the starter phase of a pig's growth won't give economical performance if fed during his growing-finishing period. Likewise, young pigs won't do well if fed a grower-finisher diet.

You can get a list of the ration ingredients with a copy of the

complete article, "How Well Do Your Pigs Measure Up?" — reprint FS-911 — at your local county extension office or by mail from the Publications Distribution Room, Morrill Hall, Iowa State University, Ames, Iowa.

USDA Announces Record Drop In Butterfat Test

According to figures just released by the United States Department of Agriculture, average butterfat content of all milk produced on U. S. farms dropped from 3.96 percent in 1950 to 3.77 percent in 1959.

The decline of "19 points", in the everyday language of the milk trade, is the largest for any 10 year period since the Department started compiling the figures in 1924. It is attributed primarily to a nation-wide trend toward cows producing greater quantities of milk with a lower average fat test.

Had the 1959 milk output been achieved with larger numbers of cows testing at the 1950 level, the Department estimates that its surplus fat purchases would have tripled.

Through both experience and experiment station results, the Department says, many farmers apparently have concluded that the cost of producing milk declines with increases in milk production per cow. At the same time, additional dairymen have come to the conclusion that butterfat can be produced more cheaply with cows producing greater quantities of milk with a lower average test.

—Holstein Farm News

Roots—The Foundation of High Yields

Two Purdue University agronomists, B. O. Blair and A. R. Bertrand, asserted that four factors control plant root growth. These are aeration, moisture, temperature and soil resistance to root penetration (hard pans).

Blair cautions farmers to recognize the limitation of their own soils in relation to high crop yields. He stressed that micro-organisms are extremely important because they create optimum soil conditions.

Bertrand points out that minimum tillage helps root growth, adding that farmers should prepare a deep root bed instead of a seed bed. Plow soles restrict root growth. *—Purdue University*

TRACTOR TALK

Bob Bargert

Tests Prove Tractor Care Saves You Money

Here's some information that comes from Kansas State, where a performance study on 50 typical farm tractors was completed recently. They say failure to maintain an engine properly can cost the owner *more* fuel to produce *less* power. The average tractor in the Kansas test was producing only seventy-five percent of its maximum power and it took one-third more fuel than normal to do it. Improper preventive maintenance is the primary culprit. with the following four points topping the list:

(1) Air Cleaner — Of the tractors tested, one out of ten had air cleaners that were choked with dirt and chaff. Servicing their cleaners resulted in an average power gain of 7.6% and an 11.4% decrease in fuel consumption.

(2) Carburetors — Adjustments were needed in almost 75% of the cases. On 23 engines found running "rich", proper adjustment decreased fuel consumption by 9.5%. (In some cases, however, excessive leaning of the carburetor may actually increase fuel consumption at full load.)

(3) Ignition Timing — Over half the tractors were found to need timing adjustment. This produced an average gain in maximum power of 5.3% with fuel consumption decreasing by the same percentage.

(4) Spark Plugs — New plugs were installed in 90% of the tractors for an average power gain of 5.3% and a 6.1% decrease in fuel consumption. In seven of the test tractors, plugs were found to be in such bad condition they caused misfiring under load. In these engines new plugs increased power 21.5% and decreased consumption 14.2%. Governors on 80% of the tractors were off. Adjustments or repairs increased horsepower 9% and cut fuel consumption by 5%.

* * *

Air Cleaner Service Important

Are you servicing your tractor air cleaner as often as you

should? If not, heed this warning from Champion Spark Plug Company on the importance of keeping air cleaners working at peak efficiency.

Champion engineers tell us a dust clogged filter may cut down on the flow of air entering the carburetor, resulting in an overly rich fuel mixture in the combustion chamber. This may cause excessive carbon build-up, fouled spark plugs, varnish and gum deposits, oil dilution, sludge, and loss of power.

Even more important is the fact that as the filter becomes clogged, small particles of dust and dirt will enter the carburetor and mix with the lubricating oil to form an effective grinding compound. This compound has the same effect on cylinder walls, rings and valves as rubbing them with sandpaper. The result — excessive engine wear and shorter engine life.

Just in case you haven't considered how much dirt gets into the air cleaner, keep in mind there are one-million particles of dust in one cubic foot of air. Add to this the fact that it takes approximately 20 tons of air to burn a gallon of gas, and you have an idea just how much dirt enters that air cleaner.

And, remember, when the cleaner has absorbed its limit, the dirt and dust may move right through it into the engine. Don't take a chance on damaging your tractor engine. Always follow the manufacturer's recommendations on air cleaner servicing.

* * *

Correct Engine Temperature Important

Maintaining correct operating temperature on a tractor engine is very important. Too cool an engine (often indicated by continually fouling spark plugs) may reduce fuel economy, decrease available horsepower, and shorten engine life.

On the other hand, too hot an engine (sometimes indicated by spark plug electrode burning) can result in poor engine performance and excessive wear of engine components.

Of the two conditions, most farm problems center on engines which operate too cool. This is due mainly to the fact that tractor engines are designed with excess cooling capacity so they can handle heavy loads in hot weather without overheating. However, because of this design characteristic, when the tractor is operated under light engine loads or in relatively cold weather, engine operating temperatures become too low unless precautions are taken to make the engine run hotter.

Usually, this is accomplished by covering the lower part of the

radiator, which in effect, increases the temperature of the water flowing from the bottom of the radiator into the cooler lower part of the engine. It's the effect of this cold water entering the engine which can cause too low an operating temperature, hence the reason for covering the radiator to increase cooling water temperature.

You may not think that too cool an engine operating temperature has much effect on engine performance, but according to engineers, an engine running too cool can increase cylinder wear far beyond normal limits and have a tendency to foul spark plugs.

* * *

No Room For Sediment

If you have trouble with engine surging and power loss when operating your tractor, you'll probably think of carburetion as the cause of the trouble. Check the fuel filter and sediment bowl before tearing into the carburetor. You might save yourself a lot of time and temper. Your best bet, of course, is to check them *before* you experience trouble; in fact, the fuel filter and sediment bowl should be examined daily . . . cleaned weekly. This is especially important after a sudden change in outside temperature, which can cause condensation in the gas tank. If you find water and dirt in the sediment bowl clean it out and wash the filter with solvent. If it has a throw-away element, replace it. When reinstalling the glass bowl, be sure the gasket surfaces are in good condition, to prevent leaks.

Checking Governors Cuts Tractor Costs

It's a money-saving practice to check farm tractor governors regularly, says J. B. Richardson, University of Florida agricultural engineer.

A poorly adjusted governor wastes fuel and causes power loss when pulling is hardest. It's one of the most commonly overlooked causes of poor fuel efficiency.

In recent tests 85 percent of the tractors checked had governor speeds either too high or too low, according to manufacturer's recommendations. Following proper adjustment, power output jumped 10 percent and fuel efficiency was increased an average of 5 percent.

Often a minor carburetor adjustment will add to the saving. It may take some new parts to correct the trouble, but it is still a good place to cut down on tractor operating cost, Richardson says.

—University of Florida

Chimney Smoke

by Irene Rudie

Give this house, O traveler, pray,
A blessing as you pass this way.
And if you've time, I beg your pardon,
While you're at it — bless the garden.
Author Unknown

★ ★ ★

A pretty picture: a girl in a pink dress, carrying a yellow bowl of bright green lettuce from the garden.

★ ★ ★

There is nothing as entertaining as one of those country auctions where everything on the place is sold, including every last scrap from the house, pots and pans, dishes, books, knick-knacks, crocheted doilies, and phonograph records. The whole neighborhood comes to look, to visit, and even to buy.

★ ★ ★

Strips of adhesive tape stuck to the bottom of a granite dishpan will prevent it from being chipped in the sink.

★ ★ ★

For a carefree hot meal at a family picnic, serve a "hobo dinner". Have a square of heavy aluminum foil for each person. On this place a large, browned hamburger patty, a few slices of raw potato, onion, peas or other vegetable, salt, pepper, and a heaping tablespoon of any undiluted canned soup. Fold the foil to seal and bake about an hour over hot coals at the picnic. Tin cans with foil covers may be used. Provide rolls, pickles, milk, coffee.

★ ★ ★

A small boy in a supermarket with his mother was told he couldn't have a desired toy because she didn't have enough money, to which he answered that Daddy didn't need money to buy things, "He takes out his checkbook and just writes a little ways!"

★ ★ ★

To cure yourself of the tobacco habit, says an old book of household hints, chew the fresh inner bark of yellow poplar, or the dried and powdered bark may be mixed with sugar and extract of licorice, formed into pills to be chewed whenever the d e s i r e comes for a chew or a smoke.

What's In A Head?

Selecting meaty animals for the breeding herd is basic in meat-animal production. Head dimensions have little effect . . .

Condensed from North Carolina Research and Farming
T. N. Blumer

MANY beef cattle breeders believe that short, wide heads in breeding stock are related to the development of desirable carcass characteristics. Tests recently conducted at the North Carolina Experiment Station indicate there is little justification for this belief.

We made carcass measurements on over 200 beef steers. These steers varied widely in type and weight. The ratio of head length to width showed little evidence of being associated with development of other parts of the animal.

The amount of fat, lean and bone in the ninth, tenth and eleventh rib section is often used as an indicator of the amount of these substances in the entire beef carcass. We calculated these values for the 200 steers. Comparing the head length-to-width ratio with the rib section values, we found little connection between the two.

Using either head length or width in predicting the final carcass grade, area of rib-eye muscle, and per cent fat, lean and bone seems to have no sound basis (see table).

Other measurements we made included weight of the feet, viscera, hide, liver, heart, length and width of carcass and length of round. Again the ratio of head length to head width had little bearing on these carcass characteristics.

The dimensions of the head appear to be useful only in selecting for size in breeding animals. We found the length and width of the head to be about equally associated with size of animal.

Animals with wider or longer heads generally were heavier and longer than average. Also, the weights of the hide, viscera, liver, feet and heart were correspondingly greater.

Selecting meaty animals for the breeding herd and fattening stock

Reprinted from North Carolina Research and Farming,
Agricultural Experiment Station, North Carolina State College, Raleigh, North Carolina

HEAD MEASUREMENT CORRELATIONS*

	Head length Head width	Head length	Head width
% Lean	.00	−.08	−.05
% Fat	.08	.04	.11
% Bone	−.17	.03	.14
Carcass grade	−.24	.09	−.18
Area of ribeye	.11	.11	.18
Cold carcass weight	.21	.40	.48
Length of carcass	.14	.38	.40
Width of carcass	.10	.26	.27
Length of round	.10	.40	47
Liver weight	.03	.36	.27
Heart weight	−.11	.39	.14
Hide weight	.13	.39	.40
Feet weight	−.02	.52	.34
Viscera weight	.18	.34	.41

*All values have been corrected for treatment effects (ration).

is basic in meat-animal production. Head dimensions seem to be of practically no consequence in selecting for meat characteristics when based on the above measurements.

Bees Help Make Women Beautiful

Women can thank the bee for helping to beautify them.

The cosmetics industry is the biggest single user of beeswax in the nation. It's an ingredient in face creams, lotions, ointments, lipstick, rouges and other cosmetics.

"There are many other uses for this end product of the bee—so many that each year the U.S. has to import millions of pounds of beeswax," says W. A. Stephen, beekeeper for the North Carolina State College Extension Service. "From four to five million pounds a year are produced in the U.S."

Dentists use it in preparing inlays and other dental fixtures; tailors and cobblers use it on thread; canvas-makers waterproof their product with it; manufacturers of electric wiring use it in wire insulation.

Beeswax once was a common source of light. Even today, all candles used in Roman Catholic churches are made mostly of beeswax.

"Beeswax is unsurpassed today for the qualities which made it so useful to the ancients," says Stephen, "and we use more of it all the time." —*North Carolina State College*

Minerals Are A 'Must'

This British dairy article tells of the need for minerals and how to supply them in feed supplements . . .

Condensed from Dairy Farmer

Roger Perkins

WE all accept the fact that minerals are essential in cattle rations. Health and production soon suffer if we try to ignore this basic truth.

Why are minerals so important and what are their functions? Let us look at just a few of the jobs which they perform in a cow's body.

1. They maintain "tone" in the nerves and muscles.

2. They are used in the production of milk and the growth of an unborn calf.

3. Some are used in large quantities to build and repair the bones and teeth.

4. Others are similarly needed for the soft tissues, body fluids and blood.

5. Minerals can also be essential for the special chemical processes which must occur if an animal is to remain alive and well.

There are more than fifty different minerals in a cow's body but most of them are needed only in small quantities.

The mineral content of normal feed such as hay and greens will meet most requirements without a separate supplement being necessary, but there are a few minerals which cannot be fully provided from natural sources. It is these which must be given to cattle in an artificial form.

For the sake of convenience, they are divided into two categories — "crude minerals" which are needed in comparatively large amount and "trace elements" which are included in much smaller amounts.

Crude Minerals

Calcium and phosphorus are closely associated. They are both needed for the formation and repair of bones and teeth; a cow also uses them in the production of milk and the growth of her unborn calf.

Bones are not only largely composed of calcium and phosphorus, the bone marrow itself contains

Reprinted by permission from Dairy Farmer, Lloyds Chambers, Ipswich, England

reserves of these minerals which are stored there until needed in other parts of the body. If the reserves are exhausted, the skeleton becomes brittle and breaks easily.

The use and storage of these two minerals is controlled by vitamin D; abnormal bone conditions such as rickets will occur if there is a deficiency of vitamin D or phosphorus. This is particularly serious in young stock which are growing rapidly.

Phosphorus deficiency can also cause financial losses in adult cattle because it may cause infertility.

The cereals and vegetable proteins are poor in calcium but contain moderate levels of phosphorus. The bulk green foods are more variable in analysis and cannot be considered as good sources of crude minerals.

These quantities are not sufficient, nor the proportions correct, for a hard-working dairy animal —a correct balance between calcium and phosphorus is even more important than the actual amounts provided. It is usually recommended that the proportions should be equal—1 part calcium (as CaO) to 1 part phosphorus (as P-2 O-5).

Swine researchers say it's just as important to supply water for young pigs as it is to give them a creep feed. Pigs will eat more fed if water is available.

Chlorine is given to livestock in the form of common salt. This is important because it helps to control the work of body fluids, it is a constituent of blood, and it aids digestion of food in the gut.

It is also included in production rations to make them more attractive and palatable.

Most farm foodstuffs have a low salt content and additional supplies must be provided. This can be done by mixing salt into the production ration and placing salt licks in the yards and fields.

Trace Elements

These are needed to perform a a wide variety of duties and they are included in cattle foods as an insurance against deficiency diseases.

IODINE is needed for healthy function of the thyroid glands. Deficiencies of iodine are found in certain types of soil. Cattle in these areas may develop goitre (swelling of the thyroid gland). This gland has a strong influence on the oestrus cycle, so infertility may occur when it is not working properly.

IRON is a major constituent of blood. Iron deficiency causes anaemia which leads to lower oxygen levels in the blood and subsequently poorer health.

MAGNESIUM plays an essential part in the work of the ner-

vous system. Cattle receiving inadequate supplies are excitable and suffer with poor co-ordination of the muscles. Grass staggers is an obvious example of the trouble which occurs when the magnesium level of the blood is allowed to fall to a dangerous extent.

COPPER deficiency shows itself in a dull moth-eaten coat and grey areas around the eyes which may be mistaken for ringworm. Copper is associated with iron in the formation of blood cells, but serious deficiencies in cattle are fortunately rare. Good reserves can be built up in the calf if the dam is adequately fed before calving.

COBALT is also useful in maintaining the blood in good condition because it is a constituent of the anti-anaemia factor, vitamin B-12, which is manufactured in the rumen.

Supplements

There are many ways of supplying minerals to cattle—mineral licks, vitamin/trace element additives, complete mineral mixes, vitamin/mineral/protein concentrates, and so forth. The wide variety of products on the market can sometimes cause confusion and it is important for the home-mixer to know just how far he can go in adding his own "bits and pieces".

To deal with the trace elements first, it is impossible accurately to weigh or mix these on the farm. The quantities are extremely small—too little may result in deficiency diseases while too much can be highly poisonous.

Always purchase a pre-mixed additive which has been specially designed for farm-mixed cattle rations. Some of these also contain stabilized forms of vitamins A and D, so the single additive solves two mixing problems simultaneously.

Stick to the manufacturer's instructions regarding the correct rate of inclusion. And get expert advice if you think your herd has a deficiency problem.

Many of us spend half our time wishing for things we could have if we didn't spend half our time wishing.

The crude minerals do not present the same difficulties and it is quite easy to mix sufficient quantities of phosphorus, calcium and salt into your own rations.

Steamed bone meal is a good source of both calcium and phosphorus and it can be purchased reasonably cheap. Limestone flour is also used as a source of calcium.

A typical crude mineral mixture for standard cattle feed designed for calf rearing or milk production can be based on the following quantities:

22 lbs steamed bone meal
22 lb limestone flour
12 lb salt
—
56 lb per ton of ration
—

This supplement will give safe levels of CaO and P-2 O-5 in the correct proportions and the cost is very reasonable. It will give a good measure of insurance against health and fertility troubles providing the standard of stock husbandry is good and the conditions normal.

Special-Purpose Mixtures

Different types of mineral supplement can be used to meet special requirements. For example, silage contains low levels of phosphorus and infertility is often associated with self-feed units where the cows are relying upon this material for maintenance plus the first two or three gallons of milk.

Under these conditions it is wise to provide an extra margin of steamed bone meal in the dairy feed to balance the shortcomings of the silage. An extra 28 lb of bone flour can be added to the quantities suggested above.

Similarly, extra magnesium has a highly beneficial effect in preventing grass staggers at the end of the winter season and when the herd is first turned out onto spring grazing.

Calcined magnesite is the common form of supplementary magnesium in cattle foods and cows should have a daily allowance of 2 oz. per head during the last six weeks of winter (late February to early April).

It can be given separately to each individual cow or, where this is not convenient, mixed into the production ration at the rate of 35 lb. per ton. This will provide 2 oz. magnesite per cow as long as they are eating a minimum of 8 lb. production ration per day.

When adding vitamin and mineral supplements to a ration it is best to "pre-mix" them. This is a simple matter and it helps to ensure that these ingredients, which are used in comparatively small quantities, will be thoroughly dispersed throughout the finished compound.

Big shots are only little shots who keep shooting.

For example, when mixing a ton of coarse dairy ration, the herdsman weighs the necessary amount of supplement and then shovel-mixes it into 200 lbs. of ground grain or similar fine-textured material. This "pre-mix" is then mixed into the rest of the ration to give a complete 1 ton batch.

The extra time and effort is fully justified by the improved efficiency and uniform quality of the food.

Should You Chop Once Or Twice Daily ?

It's a waste of time and money to chop grass more than once a day for smaller herds, Ohio studies prove . . .

Condensed from Ohio Farm and Home Research
A. D. Pratt and *R. R. Davis*

MANY situations such as isolated fields and shrinking acres make green-chopping and feeding of freshly cut grass (soilage) very desirable. That daily harvest permitted more cows to be kept on a fixed acreage was shown early in this century but the hand labor required was often prohibitive.

Development of field choppers and self-unloading wagons has materially reduced man-hour requirements but leaves the economics open to question. A survey by Shaudys and Sitterley at the Ohio Agricultural Experiment Station showed that 350 to 400 more pounds of milk must be produced per acre by green chopping to defray the increased costs due to machine harvests over rotational grazing.

Once or Twice?

A survey of dairy farms doing green chopping was made by Hoglund of Michigan who found that those who continued the practice had herds of 45 or more cows. When a full load can be harvested at a cutting, the use of time is more efficient. Cutting of a full load twice daily would be ideal. But would it be satisfactory to cut a full load only once daily for smaller herds?

To test this question an experiment was conducted in 1959 over a period of 111 days. Thirty-six Holsteins and Jerseys were sorted into six groups of six cows each according to breed, age, weight and milk production and assigned to treatments at random. The treatments consisted of three rates of grain feeding on once daily and on twice daily chopping.

The three levels of grain feeding were (1) no grain, (2) quarter grain (0.1 pound of grain per pound of milk above 20 for Holsteins and 0.125 pound of grain per pound of milk above 12 for Jerseys), and (3) half grain (double this amount).

For a two-week period enough

Reprinted from Ohio Farm and Home Research, Ohio Agricultural Experiment Station, Wooster, Ohio

soilage was chopped in the morning to feed all cows their morning feed and enough more to feed one-half at night. Fresh feed was chopped for the other half. For the next two weeks the larger amount was chopped in time for the evening feeding. The time of harvesting the larger amount was alternated thus by two-week periods throughout the experiment.

Heating of Soilage

The soilage carried over from one feeding until the next was left in a pile on the feeding alley floor and thermometers were inserted at the top of the pile, near the bottom and midway between the two. The least increase in temperature for a two-week period was 10.8 degrees F. in early June while the highest was 38.2 degrees in late July. For the entire experiment the average increase in temperature was 17.3 degrees from the morning until the afternoon feeding and 31 degrees from the afternoon until the morning feeding.

Statistical analysis of the data on milk yields and on consumption of dry matter did not show a significant difference in milk production for those receiving soilage cut once and cut twice daily, while the dry matter intake was identical. Weight changes of cows were not affected appreciably by harvest schedule.

Cows fed no grain and the "quarter" grain rate produced more milk on soilage cut twice daily but the differences were not significant. Grain feeding met with a significant response—five pounds of milk daily for the "half" grain level.

These results would indicate that no extra expense is justified to provide soilage cut fresh twice daily.

On Dairy Cow Feeding and Management

Research at the University of Minnesota shows that the effects of feeding and management are often overlooked in evaluating milk and butterfat production records.

In a study of one herd's records over a 19-year period, the Minnesota researchers found that only half of the year-to-year variation in the average butterfat production was due to changes in heredity. In one extreme case, the average of the herd under study jumped 62 pounds of butterfat from one year to the next. Yet, careful analysis of the records showed that only 10 pounds of this increase could be explained by culling low producers and adding replacements. The average increase due to inheritance per year was 19 pounds of butterfat.

—*Canadian Ayrshire Review*

The Passing Of The Passenger

A last remnant of an American heritage . . .

Condensed from Wallaces Farmer
Wm. P. Schramm

FROM the viewpoint of today's sportsman the wild passenger pigeon would have been as good a gun target and table palatability as the partridge, quail, and mourning dove.

In the period of the 1830's John James Audubon, author of what is still the classic of bird books, "Birds of America," recorded the flight of a passenger pigeon flock. He estimated it to be composed of a thousand million birds!

At a 60 m.p.h. speed, the pigeons sped over him in such numbers that they blotted out the sun, making the sky appear overcast from horizon to horizon. Other ornithologists have left for us the same kind of written records of the passenger pigeon.

But not only have wild-life observers of the past left written records of them, the birds themselves appear to have left behind convincing evidence of their numbers.

During nesting seasons passengers took over whole forest areas covering hundreds of square miles. Many trees were virtually stacked with their twig-built nests. The largest trees probably held several hundred nests.

After the brood's hatch, the fledglings' weights were so great that the branches broke off like in a sleet storm, spilling the nests' occupants to the ground.

Time after time there have been accounts of discoveries in northern Minnesota, Wisconsin, and Michigan forests of acres of broken trees.

Migrating in flocks of millions it is not hard to estimate the enormous quantities of feed consumed by the birds. Being gluttons and having the chance, they gorged until their crops were about to burst.

They had to eat insects, because there could not have been enough seeds, berries, and wild fruits to sustain the millions. What happened to a grasshopper scourge, whose numbers were in astronomical figures, when it ran into a passenger migration, is easy to visualize. Fact is, not until the pigeons reached the extinct point did grasshoppers begin destroying farmers' crops.

Of course the birds could have

Reprinted by permission from Wallaces Farmer, 1912 Grand Avenue, Des Moines 5, Iowa

easily devoured a farmer's crops in a matter of minutes. But with conservative methods their numbers could have been kept within a safe limit.

Today, of the thousands of visitors who pass thru the many exhibit rooms of the Smithsonian Institution, Washington, D. C., few give more than a glance at the lone mounted passenger pigeon there. Few know the tragic story behind that stuffed bird and its millions of forebearers.

As natural conservationists, Indians slew no more than their appetites insisted on. Then came the white man. He soon discovered the passenger to be something a gourmet would relish. And the pigeon could be brought to the pot and the spit-stake far easier than a buffalo.

Traveling in such immense numbers the birds often flew so near the ground they could be batted down with long sticks. This did not make a noticeable reduction in their numbers.

The railroad came and it brought the professional pigeon hunter. It appears that the biggest slaughter of the passengers took place between 1850-70. By taking them wholesale and shipping them to the eastern market, a hunter could make up to $50 a day.

By the early 1880's the pigeons had been noticeably thinned out. In 1900 there were definite signs they were close to the extinction point. By 1905 they vanished altogether in the wild state.

In 1880, someone at the Cincinnati Zoological Gardens, became aware that the passengers were going the way of the famed Australian dodo bird. They prevailed on the Gardens to acquire several pairs from the wild state in an effort to propagate a last remnant of an American heritage in wildlife. But it was futile. The young did not thrive in captivity.

By 1914, the Cincinnati Gardens had only one bird left, a female. Hatched in 1885, she was named Martha. On September 16, 1914, she died, the last of her kind.

Cyrus McCormick, inventor of the reaper, got the idea of vibrating blades for cutting the grain, from getting his ear nicked by a pair of barber clippers.

At the Smithsonian Institution, a taxidermist's skill preserved her as a grim lesson of man's unbridled ruthlessness toward wildlife.

As such a reminder the stuffed Martha should serve her purpose for the game hog and those who are inclined to think our game laws are too strict and conservation practices too far-fetched.

FUN ON THE FARM

A Collection of Jokes and

Humorous Farm Stories

WANTED

I long for a cow of modern make,
That milks five days for leisure's sake,
That sleeps on Saturday, snores on Sunday,
And starts afresh again on Monday.
I wish for a herd that knows the way
To wash each other day by day,
That never bothers to excite us,
With chills or fever or mastitis.
I sigh for a new and better breed,
That takes less grooming and less feed,
That has the reason, wit and wisdom,
To use the seat and flushing system.
I pray each week-end, long and clear,
Less work to do from year to year,
And cows that reach production's peak
All in a five-day working week.

—*Holstein News*

★ ★ ★

An old bachelor farmer lived alone on his little farm with one cow. Each evening after milking the cow he would lift the pail, take a healthy drink of milk, throw the rest over the fence, and carefully wash the pail.

Witnessing this, one of his neighbors asked why. "Well", the bachelor said, "chores are done, dinners over, and the dishes are washed."

★ ★ ★

Hear about the cow who went to see a psychiatrist? She had a fodder complex.

★ ★ ★

The middle-age man was shuffling along, bent over at the waist, as his wife helped him into the doctor's waiting room. A woman in the office viewed the scene in sympathy. "Arthritis with complications?" she asked. The wife shook her head. "Do-it-yourself," she explained, "with concrete blocks." —*The Texas Future Farmer*

★ ★ ★

Success is more-or-less relative; the more success—the more relatives.

★ ★ ★

A man had been plagued for weeks with a bothersome rash

which confused his doctor. The physician, after a long examination, hemmed and hawed and finally asked:

"Have you ever had this kind of condition before?"

The answer was a vigorous "Yes."

"Well," said the doctor, "looks like you've got it again."

★ ★ ★

"My, my," grandpa complained, "what's wrong with the younger generation?"

"The main thing, I think," soothed grandma, "is that too many of us don't belong to it any more."

★ ★ ★

It's the cute little calves that make men horse around.

★ ★ ★

"Papa," asked the city boy vacationing in the country, "what makes roosters crow so loudly every morning?"

"They are merely making the most of their opportunity before the hens wake up!" he answered. —*Mrs. Henry Sherrer in the Progressive Farmer*

★ ★ ★

The story is told of a farm worker named, Ole. After being hired he worked three weeks and then didn't show up for five straight days. Finally, in desperation, the farm manager went through the country looking for Ole. Going past the insane asylum he saw Ole sitting on the lawn in the shade of a big elm tree. He stopped and asked, "Ole, what in the world are you doing here?" Ole replied, "I'm insane. Try it sometime. It sure has farming beat."

★ ★ ★

A fool and his money are soon invited places.

★ ★ ★

A mountaineer took his son to a school to enroll him.

"My boy's after larnin', what d'ya have?" he asked the teacher. "We offer English, trigonometry, spelling, etc.," she replied.

"Well, give him some of that thar trigernometry; he's the worst shot in the family." —*The Farmer*

★ ★ ★

The only thing that goes as far as it did 10 years ago is the dime that rolls under the bed.

★ ★ ★

A story of true cooperation is told about the hunter who went out to shoot a bear for a fur coat. At the same time, a bear went out who wanted his breakfast.

In a short time the hunter and the bear met in the woods. The congenial bear said, "Let's meet in my den and talk this over."

Moments later the bear came out — he had his breakfast and the hunter had his fur coat.

★ ★ ★

The new hired man worked very hard for the first three days

on his new job. The fourth day it rained and he was put to work sorting a barrel of apples in the basement.

After about ten minutes of the basement job he came upstairs and proclaimed that he had quit. Showing amazement, his farm boss asked, "Why? Is the work too hard?"

The hired man replied, "I don't mind the hard work too much but I just can't make those decisions."

★ ★ ★

Man knows what's on the other side of the moon but still can't tell what's in the back of his wife's head.

★ ★ ★

The latest thing in men's clothing this summer seems to be women.

★ ★ ★

"It's useless sowing seeds two feet deep," Fothers advised his neighbor over the garden fence.

"I know," was the reply, "but it annoys the birds." —*Implement & Tractor*

★ ★ ★

A famous movie cowboy was taken to the hospital with severe burns. That's what comes from making love on the range.

★ ★ ★

An old Indian stood on top of a hill with his son, looking over the beautiful valley below them. Said the old Indian, "Some day, my son, all this land will belong to the Indian again. Paleface all go to the moon."

★ ★ ★

Not many years ago you used to dream about making the money your are now starving on.

★ ★ ★

The beauty of the old-fashioned blacksmith was that when you brought your horse to be shod, he didn't think of a dozen other things that should be done to it.

—*A. I. Digest*

★ ★ ★

When a Russian farm delegation was in this country they visited a factory in California. One of the group asked a foreman how many hours his men were working per week.

"Forty," said the foreman.

The Russian shook his head, replying that in his country they worked seventy hours a week.

"Oh, you'd never get this crew here to work seventy hours," said the foreman. "They're a bunch of Commies." —*Arkansas Valley Journal*

★ ★ ★

Modern girls wear less on the street than grandmother did in bed.

★ ★ ★

A little girl came home with a box of dirt and cautioned her mother to be very careful with it.

"What in the world is it?" her mother asked.

"It's Instant Mud Pies," said

the budding homemaker. —*Sunshine Magazine*

★ ★ ★

There was a time when heaven protected the working girl. Now it takes a union, a wage-hour law, unemployment compensation, social security, health insurance and a pension plan. —*Elyria, Ohio, Chronicle-Telegram*

★ ★ ★

Into a saloon came a fellow leading a horse. "Gimme a slug of rye, for my friend here," he said.

The barkeep obliged, and the fellow opened the horse's mouth, slung in the jolt, and ordered another which went the same way.

"What about yourself?" asked the nose-paint artist. "Ain'tcha gonna have anything?"

"Not me," says the horse's owner mounting the animal and heading it out of the saloon. "I'm driving." —*Farm Store Merchandising*

★ ★ ★

Life: An everlasting struggle to keep money coming in and teeth and hair from coming out.

★ ★ ★

When a cow had been killed by a train, it fell to the lot of the foreman to make out a report of the accident on a form that the railroad had for the purpose. He checked all the facts and filled in all the lines readily enough until he came to one headed: "Disposition of carcass." The foreman scratched his head for a moment, then wrote: "Kind and gentle." —*Holstein-Friesian World*

★ ★ ★

TV today often resembles old furniture. It's e i t h e r "Early American" or "Old English".

★ ★ ★

"You cannot get eggs without hens," said the speaker, stressing the point.

"My Dad can," piped a small voice from the rear.

"Please explain yourself, little boy," said the speaker.

"He keeps ducks," yelled the boyish voice from the rear.

—*Hoard's Dairyman*

★ ★ ★

An old lady was sending a Bible to a friend overseas. Examining the package carefully, the postal clerk inquired if it contained anything breakable.

"Only the Ten Commandments," was the reply.

★ ★ ★

Definition of an American in 4 words:

Hurry
Worry
Marry
Bury

Contributions for this page are welcome. Send your "Fun On The Farm" story to Farmer's Digest, Fort Atkinson, Wisconsin.

What Is Quality In Cotton?

The meaning given the term, "quality cotton", depends mainly on whether the person speaking is a cotton grower, ginner, processor, or research specialist . . .

Condensed from Implement & Tractor
Frank Buckingham

IMPROVEMENT of cotton quality (a rather nebulous term) means, to a cotton producer and many research men, a higher grade and lower moisture content of the raw cotton at the gin.

This is understandable, since at present these factors normally determine the price paid the grower for his cotton, and he has little concern for the problems of the cotton mills which process the cotton later.

To a mill man cotton quality means fewer short fibers, less fiber breakage and stronger yarns. For these reasons many mill operators prefer hand picked cotton if they can get it, even though some university specialists insist that, from the farmer's standpoint, mechanical harvesting is just as good as hand picking. The machinery men say it is up to the plant breeders to develop varieties which will withstand more severe mechanical operations.

Faster machine operation and improved milling equipment have increased the problems faced by cotton processors. These people hasten to add that, in general, cotton quality has been getting better in recent years, but that certain areas still need improvement.

The question, "What is the cotton quality problem?" was raised by George S. Buck, Jr. of the National Cotton Council in a paper entitled, "Cotton Quality in Perspective." He stated that it is oversimplification to lump the whole problem under the term "gin damage," as has been common in some areas. Although there has always been a certain amount of gin damage, it is certainly not the entire answer.

Analysis of USDA cotton quality surveys from 1946 to 1959 shows an increase of 5 per cent in strength, drop in non-lint content of about one-third, no deterioration in color, and nearly

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constant length of staple. Present cottons are a little finer but are still in the desirable range and until recently the trend in length uniformity has been upward.

On the other hand, Buck pointed out, the yarn appearance index has trended rather steadily downward in the last 15 years, and in the last four years there has been a decline in fiber length uniformity and yarn strength.

A large percentage of short fibers in the cotton can cause some mills a great deal of trouble, but it is possible to handle them in other plants without difficulty. Most mills consider a short fiber content (fibers less than half an inch in length) of 14 per cent as reasonable, but some show up with as many as 25 per cent of the fibers less than a half-inch which can cause a lot of trouble in the mill.

Overdrying of cotton was also listed by Buck as a factor in lowering cotton quality. Such drying can introduce cracks and fractures and make the fibers more subject to breakage later on.

Vinegar can be made from peaches, persimmons, pears, oranges, berries, grapes, figs, or many other fruits, besides apples.

Leaf and other trash particles in the cotton create another problem, especially when the particle size is quite small. Tests indicate that two cottons carrying the same amount of trash may produce yarns with different trash content if the trash particle size in one cotton is much smaller than in the other one.

Buck suggests characterizing cotton with five property measurements which could be used as a supplement to, or substitute for, the cotton classer's present evaluation. These five properties are:

1. *Fineness*—For this, tests are already pretty well worked out. Mills are learning to use finer cottons but there needs to be more done on improving tests and uses of fine fibers.

2. *Length*—Cotton classers are quick and reasonably accurate, but they don't provide adequate information regarding fiber length distribution. Improved methods of length determination are being developed and will help improve cotton quality when used on a wide-spread basis.

3. *Strength*—Present tests are too slow and need improved dependability and accuracy. Strength tests may not have to be used on each bale but such testing would help from a merchandising standpoint.

4. *Trash content and trash character*—Visual examination is not enough. The trash character and ease of removability as well as the amount of trash in a particular cotton must be known. Some progress is being made in

developing methods of determining both content and character.

5. *Quality X.*—This is an undetermined quality that may involve color, neps, surface frictional character and possibly other factors, singly or in some combination.

Are all of these measurements necessary? Yes, says Buck, if we want to solve the cotton quality problem. Mills must identify their problems if they plan to avoid problem cottons. And naturally the producer and ginner cannot supply quality cottons until they know what quality is. Then when top quality gets the top price we will have all the incentive we need to produce quality cottons, said Buck.

Buck summed up the entire cotton quality question as being "the problem of obtaining dependable performance and value from cotton, regardless of the state of technology used in its production, harvesting, ginning, and spinning. It is also the problem of preserving in cotton those inherent qualities which make it a good spinning fiber and a valuable consumer product."

Breed Heifers Early

Heifers bred at the early age of 15 to 16 months will make you more money than those bred at 21 to 23 months. In New York tests heifers calving at two years of age outproduced those that freshened at 32 months. Cows in the younger freshening group had produced an average of 38,107 pounds of milk each before they were five years old. It took the late freshening heifers an extra ten months to produce that much. Similar results were obtained in Wisconsin trials. Naturally, heifers must have good growth for early breeding. Feed your young stock plenty of high quality roughage, supplemented with a balanced growing ration. Then you'll be in a position to have early-freshening heifers that will make you money

—Farm Business Letter

A good dip or spray will save the farmer hundreds of pounds of milk and make many dollars worth of growth if cattle, hogs and sheep are kept free of lice and other parasites. University veterinarians say animals should be kept free of parasites by allowing them access to an oiler supplied with a good parasiticide. Otherwise livestock will be bothered with freeloaders.

Calf Raising

It is surprising what a little extra attention can do for calves and how it affects their lives, even when they reach maturity . . .

Condensed from Guernsey Breeders' Journal

Gerald M. Jenkins, Lookout Valley Farm, Lake Geneva, Wisconsin

TO GET a calf started properly, it must be born in clean, healthy surroundings.

During the summer months, it is possible for calves to be born on pasture fairly close to the barns. However, here in Wisconsin, where we often have cold rains and some cloudy weather, we find it best for cows to freshen in clean, roomy, well-bedded box stalls. This also makes it much easier to watch the cow and give aid if necessary at calving time. We try to check on a cow that is close up to calving about every two hours until the calve is born.

After calving, the wet bedding is removed from the stall and a bale of fresh bedding is shaken up in the stall. A five per cent solution of iodine is poured onto the navel and navel cord of the calf, and we see to it that the calf is nursing within two hours after birth. Sometimes this necessitates assistance. Calves are left with their dams for 48 hours, unless the cow has had a previous history or shows symptoms of milk fever. In that case, the calf is removed from the stall and started on hand feeding with colostrum milk from the dam.

When the calf is taken from its dam, a leather neck strap is put on and the calf is tied in a small tie stall, which measures three and one half feet long by two and one half feet wide. These little tie stalls are placed in a box stall, 10 feet by 14 feet, four stalls at each end of the large box stall. These little tie stalls have solid partitions so that one calf cannot reach another to suck on ears or mouths. For a number of years we have used nipple pails, and these are washed and sterilized after use the same as our milking equipment. In our particular set-up, only tie stalls are used for the cows, so that by handling these baby calves with neck straps, they are accustomed to it all their lives, and we can put a neck strap on a heifer or cow any place, even in the pasture, and lead it into the barn.

Reprinted by permission from Guernsey Breeders' Journal, Petersborough, New Hampshire

The amount of milk fed to each calf is three pounds per feeding, or six pounds a day. This milk is measured, rather than weighed, as it is a much faster procedure. One half pint of warm water is added each feeding for the first 10 days. This six pounds of milk a day is fed until the calves are six to eight weeks old. Then they are cut to two pounds per feeding, or four pounds a day, until they are four months old.

Grain feeding is started when the calf is five days old, using a commercial calf starter feed. At this time, after each milk feeding, the calf is snapped up at a trough of grain, and some of the grain is placed in its mouth. We have had no trouble getting them started to eat grain immediately. After the calves have developed this appetite for grain, they are turned loose for two hours after each milk feeding. They have ample room in this size stall for exercising. During this time they have access to grain, free access to water in a pail, as they are too young to operate a drinking fount, or cup, and free access to a salt block. They are fed enough grain so that the trough is clean within 30 minutes. After they are tied back into their stalls, they are fed the greeniest, leafiest, best hay we have at hand. We prefer second cutting of a mixture of brome-alfalfa hay.

U.S.D.A. engineers have developed a process for manufacturing dried honey. When reconstituted with water, the dried honey has nearly the flavor of fresh liquid honey.

After four months, the calves are taken off milk, and four to six calves of nearly the same age run loose in pens. They are fed a mixture of one-third calf starter feed, two-thirds home-grown grains, and the same choice quality hay as before. We see to it that the drinking fount, or cup, is kept filled until they have learned to use it. By this time we have them eating one and one half to two pounds of grain per day. Hay is fed at least three times a day, and during the winter, five times. The calves are kept on this feeding program until they are 12 months of age. No silage is fed to calves until they are 12 months old, and no calves are put on pasture until they are 12 months old.

We originally had a calf barn, separate from the main barn, where the calves had individual stalls and were on racks. We suffered severe losses, as we could not keep the building at an even temperature in winter, and the calves would get a draft under them from these racks. We think one of the most important features in a calf-raising program is the deep bedding under the calves. To start with, the stalls are

bedded with three inches of ground corncobs, or shavings, then on top of this we place six inches of chopped straw. The droppings are picked up at least four times a day, and fresh bedding is added every morning. This keeps the stalls perfectly dry and warm. Four times a year is as often as these stalls are completely cleaned, disinfected and heavily limed. One reason for moving the calves back to our main barn is that they are under observation all the time we are in the barn.

In the summer, a good fly control program must be maintained so as to keep the calves comfortable. Our program consists of spraying walls, ceilings and steel with Diazinon about three times each summer, and the daily use of fly-bait at all gathering places for flies on the floor and outside the calf pens.

We have tried other means of raising calves. We have tried milk replacers, and do not think they are as satisfactory as whole milk. We have tried, and still have, some calves on nurse cows, but here again the calves do not get used to being handled early in life. Also, the droppings cannot be observed as in tie stalls. They can get too much milk, develop fatty tissue, and are much slower to start eating grain and hay. Consequently, they do not develop nearly the depth of body or spring of rib as the calves which are hand fed. In nice warm weather, and if help is available, we like to put the calves outside in a dirt paddock for one to two hours in the morning. However, this is not always possible when we are in a hurry to get to the field.

One of the "musts" with our calf-raising program is the trimming of feet, as no doubt this helps grow a straighter leg with stronger pastern. This is done at four months, and again at eight months. Our calves are dehorned with an electric dehorner, which has proved very satisfactory. This is done on rainy days or when we cannot get into the fields. We have good results on calves from one to three months old.

Between four to six months of age, or during the fifth month, all heifers are vaccinated for Brucellosis and checked for extra teats. Any extra teats detected, even buttons, are removed by the veterinarian. We prefer to vaccinate our calves from four to six months of age, which we are allowed to do in the State of Wisconsin. The younger they are

The chimney swift is the only known bird that can beat it's wings alternately. This unusual faculty enables it to be the most manuverable bird that flies.

when vaccinated the less apt they are to show a titer at mature age. I do not believe calves should be vaccinated later than six months of age, and earlier is better if your State allows it.

We sketch our calves by the time they are two weeks old. With our size herd this can be done. However, for a larger herd, there would be the necessity of identification by numbers on a neck strap, or sketching at birth. Our sketches are sent in, and the calf registered by the time it is four months old.

There will be some sickness in calves in the best managed operations, and pneumonia and scours are the most common. Both of these must be diagnosed early. Pneumonia in any form should be treated at once. To prolong this, means a long illness and a stunted calf. Our first treatment for pneumonia is to blanket the calf with a burlap bag, give it five to 10cc of penicillin-streptomycin mixture, intermuscular, and three to five cc Corynebacterium-Pasteurella bacterin. We take the temperature at this time, and record it, and then again within six to eight or 10 hours. If the temperature is not going down, we call our veterinarian. At the first sign of pneumonia in any calf, it is always good to give all the calves in the same pen this bacterin, as it keeps the others in the pen from becoming ill. There should be more prevention in the treatment of pneumonia, and we handle this by keeping calves out of drafts, using plenty of bedding, and good ventilation.

As to calf scours, at some time or another in the past we have probably used all the antibiotics, but we have found aureomycin powders to be the most effective. However, there is nothing we have found that will straighten a calf out and get it back to normal droppings, like the use of cud-inoculation. This is done by taking a fresh cud from a cow, squeezing the juice into a cup and by holding the calf's tongue to one side pouring the juice slowly down its throat. I know this sounds a bit old-fashioned, but it does a remarkable job, in fact it has never failed to have the calf back to normal within 12 to 24 hours. Of course, cud-inoculation, in powder form, can be obtained from the veterinary. However, we have always used the juice from a fresh cud, because in our opinion the antibiotics do more to destroy the bacteria in the rumen, and this is the opposite from what we desire to accomplish. By

Fish are not born with scales. A baby fish is born naked, later sprouting scales from under the skin.

cud-inoculating the rumen, we start the digestion of food at once, since the juice from the fresh cud contains the bacteria necessary for the digestion of food.

To sum up our calf-raising program, we feel that each of the following steps is very important: 1, Clean, warm, dry, draft-free living quarters, with good ventilation; 2, good feeding program, with sanitary feeding utensils (remember it is better to have a hungry calf than a sick calf, so do not overfeed) 3, detect and treat any illness when it starts; 4, vaccinate for Brucellosis; 5, sketch calves and send papers in for registrations on time; 6, trim feet, dehorn, and eliminate extra teats at an early age as this makes a more desirable animal.

Flavored Feeds Show no Advantage In Calf Feeding Trials

Go to a lot of trouble adding special flavors to a calf's grain ration and what happens? The calf as much as ignores your efforts. That's what happened in recent feeding trials at the University of Minnesota's Southern School and Experiment Station.

Dairy researchers wondered if a flavored ration would promote greater feed intake and more rapid gains. To find out, they set up a feeding trial with a group of 32 dairy calves. Each calf was weaned early, at 29 days of age, and assigned to one of three groups. Early weaning is important because it puts greater emphasis on the grain portion of a calf's diet.

Group one received a basic concentrate ration of 39 parts ground shelled corn, 29 parts ground oats, 20 parts bran, 10 parts soybean meal, one part trace mineralized salt and one part steamed bone meal. Group two got the basic ration with synthetic sweetening, and group three received the basic grain mix with a synthetic sweet-milk flavored compound.

The calves were kept in individual pens and fed all the concentrates they cared to eat until they were 42 days old. After that they were fed 4 pounds per calf per day. Throughout the trial all calves had free access to water and good quality alfalfa hay.

At the end of 6 months all calves weighed about 350 pounds above their birth weights. Some calves in each group showed slight variations in acceptance of flavored feeds. But as a whole, no group showed a meaningful difference in feed consumed or rate of gain.

—University of Minnesota

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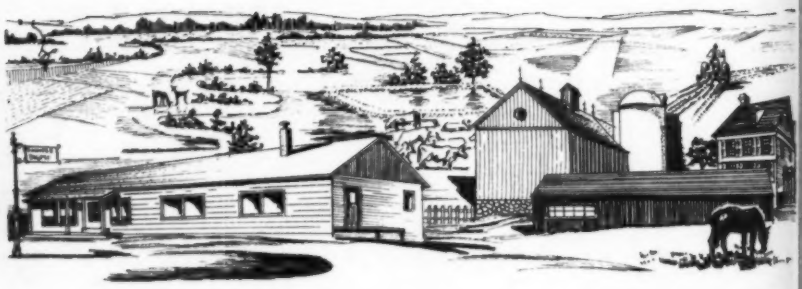

Here's a sketch of our farm where we publish Farmer's Digest. Our 200-acres are planted to corn, alfalfa, grass and trees. We farm — and we publish our magazine on a farm — because we believe that's the only way we can know what other farmers want to read. Farmer's Digest is probably the only farm magazine in the world published on the farm by farmers.

Raise 'em in Steam . . . Whip Disease?

By packing pigs into hot, steamy houses, this farmer has cut out pneumonia, tripled profits . . .

Condensed from Farm Journal
John A. Rohlf

YOU'VE heard a lot of stories about people who break all of the rules and still come out on top.

A few weeks ago in Northern Ireland I met the rule-breakin'est hog raiser I've ever seen—and one of the biggest money makers.

He's Robert Jordan, an imaginative farmer in County Down, who markets close to 20,000 hogs a year. He finishes all of them out under conditions you'd vow couldn't work. For instance:

- Hot, steamy, jam-packed houses—average temperature of 80°, humidity 90%. Less than 4½ square feet of floor space per hog.
- No feeders—he scatters feed on the floor once a day.
- No water—pigs get only whey pumped automatically from a 68,000-gallon tank.
- No disinfecting or "resting" pens—as soon as one lot goes to market, a fresh batch of feeders moves in.

As wild as this program may sound, the man gets results.

Low death loss. "It's averaged about 1%," says Jordan.

Excellent feed conversion. On his last 5,000 hogs, Jordan's records show 176 lbs. of meal (mainly barley) and 200 gals. of whey per 100 lbs. gain.

Low-cost gains. Feed runs only 8c a pound. Housing "rent," figuring 3.3 turns per year and a 10-year building life, comes to less than ¼ cent a pound.

Five men easily do all of the chores connected with the 6,000 to 7,000 hogs that Jordan has on hand at all times. They clean pens once a day, brushing manure through cracks under doors into the gutter; then feed the meal on the floor.

Jordan's gutter system works like a charm. The gutters are 2'6" deep, 6" wide. Every 8' to 10', he's installed a concrete "baffle" that extends to within 6" of the gutter floor. When the spaces between baffles fill with liquid, pressure builds up and the manure gushes through to the next

Reprinted by permission from Farm Journal, Philadelphia 5, Pennsylvania

section. "Works just like a bathroom toilet," explains Jordan.

Jordan went to his "steam-bath" system out of desperation. "We were losing 10% of our feeder pigs, mainly to pneumonia," he recalls.

"What do they do for you if you get pneumonia?" Jordan asked me. "They give you warmth, steam and no drafts, don't they?

"When we tried this for hogs it worked so well that we converted our entire program over," Jordan added. "In the last six years, we've finished out nearly 100,000 pigs in these low-roofed, well-insulated houses. Death losses are down to between 1% and 2%, feed conversion is much better, and my actual profit per pig is up three times."

The only "coddling" that Jordan does is with new arrivals. In their first week on the farm, they get water and ½-lb. of dry feed per day. He fortifies each ton of the feed with 6 lbs. of Aurofac 10-A, 1 lb. of Nitrofurazone.

Would Jordan's hog-house idea work in the Corn Belt? That's hard to say. The danger point would undoubtedly be in summer heat. Temperatures in Jordan's area seldom get over 75°.

How Cows Drink Water

An interesting investigation at the Hannah Dairy Research Institute, Ayr, Scotland, reveals that grazing cows on wet days drink little or no water, but on drier, warmer days, some will drink more than 12 gallons.

The average amount consumed daily during the investigation was found to be about 6 gallons for cows with a 3.6 gallon milk yield. Most of the animals drank four times a day. Up to four and one half gallons could be taken in one drink at a rate of one pound of water a second. *—D.H.I.A. Newsletter*

Maintaining soil fertility is an idea that man picked up with settled civilization. Backward, primitive people have always followed the policy of clearing a patch, growing something on it as long as it was productive, then starting all over by removing timber with stone axes. In parts of India, land is thus cleared, even yet, planted to a crop of bamboo, which is cut, allowed to dry, then burned, and the ashes spaded into the soil, as fertilizer. One crop is all they generally get from this land, as excessive rainfall leaches out the fertility.

Tempting Bossy's Palate

An Ohio study shows that cows eat more silage if it's the mouth-watering variety . . .

Condensed from The Furrow

NUTRIENTS in dairy roughages are important but they don't tell the whole story.

Palatability may affect feeding value and milk production just as much as nutrient content, especially if roughages make up a large part of the diet. The more palatable the silage, the more Bossie will eat and the more profitable will be her milk production.

For example, two Indiana dairy herds showed a difference of $172.65 net income per cow per year. Each owner fed the same kinds of roughage. But the big difference in income was traced to the amount of roughage consumed. Even the most efficient cow requires large amounts of palatable feed to maintain her body and high milk production.

There's money involved, too. Cows that eat large amounts of roughage dry matter don't need so much grain and expensive concentrates.

If silage is of good quality, palatability can be increased with additives and preservatives. Researchers at the Wooster, Ohio, experiment station conducted a test to find out what silages, treated or untreated, were the most palatable. Meadow crops were grass-legume mixtures.

Here Are The Results

1. Corn silage was more palatable than most meadow crop silages, regardless of preservative used. If ground ear corn is added to the green chop at the blower, the result is that the silage is more palatable than when no preservative is added.

2. Corn treated meadow crop silage was definitely more palatable than untreated meadow crop silage.

3. An untreated mixture of sweet sudan and soybean silage was almost as palatable as corn

Reprinted by permission from The Furrow, Moline, Illinois

silage and needed no conditioner or preservative.

4. Molasses-treated meadow crop silage (60 lbs. molasses per ton) was usually more palatable than untreated meadow crop silage. However, silage dry matter, amount of molasses used, and the amount of dry matter in the molasses carrier appeared to affect palatability.

5. Silage from meadow crops treated with Kylage (calcium formate and sodium nitrate) was more palatable than untreated meadow crop silage of high moisture content.

6. Silages made with sulfur dioxide or sodium metabisulfite (bisulfite) as a preservative resulted in equally palatable feed. Bisulfite, however, is safer and easier to distribute.

No additive or preservative can cure the ills of poor-quality silage. But additives can make a difference in what the cow tastes. And that can be pretty important business. Cows simply eat more silage if it tastes good.

Artificial Insemination in Swine

Three major problems still exist that hinder the application of artificial insemination to hogs under field conditions. We must find ways to:

1. Synchronize heat periods so that several sows can be bred within a short interval.

2. Store semen for a longer period.

3. Detect sows' heat period in the first stage so that insemination can be performed at the proper stage.

Although results under laboratory conditions have been quite favorable, those under field conditions have not been so promising. Results of a field trial in Iowa involving 200 sows showed a conception rate of only 45 percent 40 days after insemination. One of the major reasons for this low conception rate was reported to be the No. 3 problem above.

Certainly further research is needed on these problems before artificial insemination will become successful under farm conditions. However, its potential benefit for the swine industry cannot be denied.

—University of Illinois

Barn Need Remodeling?

How to avoid five serious mistakes often made . . .

Condensed from Pennsylvania Farmer

A. Roger Grout

"I WOULD sure change some things if I had it to do over again." This is the reaction of many farmers after completing a building job.

Probably no job will ever be perfect, but many mistakes can be prevented by getting information before the job is started.

Planning is the most important item in setting up a dairy remodeling job. Ask yourself these questions:

Can I use my own timber?

How many cows will I have?

How big are my cows now, and how big will they become in the future?

Can this job be done with farm labor?

Will this project last until it pays for itself?

A very simple plan drawn in pencil on rough paper may be sufficient to help plan a barn, but it should be drawn to scale. It is a great deal easier to erase a line than to knock out a concrete wall or move a supporting post later on.

Here are some of the more serious mistakes made in barn remodeling:

1. *Small Stalls*—Cows are getting larger and larger, but still many barns are being built with stalls 42 to 45 inches wide. Possibly this happens because we set up a certain number of cows, then try to fit them into the space available. This is like getting the cart before the horse.

Plan not for the cows you now have, but for those you will have ten years from now. This means that for a herd of Holsteins, stalls should be four and one-half feet wide by six feet long or larger. For the oldest cows, stalls can be even wider. The old cows are the ones that will return a profit to the dairyman, and stabling should consider first their comfort and long life.

It is true that a small cow in a large stall may become dirty, but this can be prevented by proper

Reprinted by permission from Pennsylvania Farmer, Harrisburg, Pennsylvania

adjustment of the stall itself or the installation of an electric cow trainer. Cow trainers are not advised unless absolutely necessary and care must be observed that they are properly adjusted for each cow.

2. *Inadequate Timber Size* — There is always a temptation in building to use what is on hand. It is common to see the joists under a hay mow supported with extra posts to prevent a breakdown of the structure. If there is a heavy load on the floor, joists need great depth or supports close together.

For example, a three-by-eight and a two-by-twelve have an equal amount of wood in cross section. On a 12-foot span, the two-by-twelve will carry 1,825 pounds or 154 pounds per foot uniformly distributed, while the three-by-eight will carry 1,366 pounds or 118 pounds per foot. To make the three-by-eight carry an equal amount, the clear span must be reduced to nine feet.

Information on selecting timber sizes is available. Publications can be obtained at most county extension offices. They make it easy for anyone to properly select the correct size of timber for a specific use.

3. *Poor Concrete* — Good materials can often be weakened by improper use and concrete is an example. Usually the mixture to give greatest strength and wear resistance is carefully measured as to ingredients. Often, however, the water is not measured. There is a tendency to make the concrete mix too wet and this will cut the strength of the concrete almost as much as leaving out part of the cement.

Another common mistake in concreting is to trowel the surface excessively with a steel trowel. This brings extra water to the surface, weakening it to the point that the surface may spall off or crack loose from the body of the concrete.

Complete directions for laying concrete blocks, mixing and placing concrete and finishing it are available from Portland Cement Association, 33 West Grand Avenue, Chicago 10, Illinois. Mistakes can be avoided and savings made if the recommended practices are followed.

Each working day during the past year, federal meat inspectors of the U. S. Department of Agriculture kept about a million pounds of unfit meat from reaching U. S. consumers.

4. *Proper Insulation* — Insulation is one of our most valuable building materials, but it too is often misused. Insulation boards are often used where a warm wall or ceiling is needed. These are

excellent materials, but for insulating the ceiling of a milkhouse or dairy stable they are not thick enough to do the job.

A hardboard ceiling is desirable, since it can be cleaned easily. With the hardboard should be used three to four inches of blanket or loose insulation material with a vapor barrier on the warm side of the insulation. The vapor barrier may be asphalted kraft paper, aluminum foil or plastic film.

5. *Green Lumber* — Farmers often have a supply of home grown timber. Planning should be done far enough ahead to cut lumber to the required sizes, then air-dry it for several months before using. This will do much to eliminate bowed and warped building frames. Use rough lumber where possible because it is about 25 per cent stronger than planed materials.

Careful planning reduces mistakes and makes better farm buildings at a lower cost per year of use. Information is available in many places and its use saves time and money.

Scientists Grow Cow Mammary Gland Cells In Test Tubes

A group of University of Illinois dairy biochemists are working to answer a question that has for centuries puzzled scientists and laymen alike. The question: How do cows make milk?

To carry out the research, Bruce Larson and his associates have kept cow udder tissue cells alive in laboratory test tubes for more than two and one-half years.

Larson says that for a short time the test tube cells actually continue to make milk in the laboratory. After a few days, however, the milk-making process stops. But the cells continue to grow and organize as if they were still in the cow.

Researchers believe these tiny test tube cells may some day unlock enough secrets to explain how milk is produced in the cow's udder.

Larson's study is also turning out information on what happens to body cells when they grow under abnormal conditions. This type of information is needed to learn why some cells become cancerous and other remain normal. —*University of Illinois*

More Marketing By The Farmer

"In being forced to produce for a market, the farmer will have to move further into the marketing of his products . . ."

Condensed from New Jersey Farm and Garden

E. H. Fallon, General Manager, Co-op League Federation Exchange

THE number one problem on the farm today is not production but marketing.

The greatest challenges and the greatest opportunities lie in that field.

The consumer — usually the housewife—is the person for whom everything is done. Her vote—her decision to buy or not to buy—decides whether any product succeeds or fails.

However, the consumer can only vote on the products that appear on the retailer's shelf. Because his shelf will not hold anywhere near all the products offered to him, he must make the first selection. This makes the retailer the real power in food marketing. And he is becoming more and more powerful as the retail food business moves into larger units and is concentrated in fewer hands. Today, 10% of the retail food stores do 68% of the total grocery business!

Between the time when a product leaves the farm and winds up in the retailer's warehouse, a great many things happen to it. To describe the organization which makes these things happen, I use the term "middle marketer." The middle marketer might be a private firm or a cooperative. In the case of any particular crop, some of the functions might be performed by one firm, and others by another.

To keep these functions straight, let's think of the middle marketer as the organization, or organizations, which performs all the services between the farmer and the retailer that make the farm product available and acceptable to the consumer.

What are these functions?

(1) Specifications for the final product, and, therefore, for the raw products that go into it.

(2) Procurement of the products from the farm.

(3) Processing. This might be simply grading and packing, or it

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could also be canning, freezing, brining, combining with other products, cooking, or whatever is physically done to the product.

(4) Quality Control. The kind of quality which the consumer demands, and the retailer insists on, must be supplied by this middle marketer. Quality control of his own products by the processor is essential, and he must also enforce quality standards on the farmers who supply him.

(5) Packaging. The middle marketer must be equipped to put the product into the kind of can, box, carton or bag the retailer and consumer want, and label it in an appealing manner.

(6) Storage. Some products have to be stored before processing. Nearly all have to be stored after processing—some for a very long period. The retailer wants the middle marketer to do the storing for him.

(7) Promotion. This is one of the things that the retailer requires, and it's up to the middle marketer to do it.

(8) Selling. Whether it's done through his own sales force or through brokers, the middle marketer has to have people making the rounds, seeing the buyers, getting them to take on his products. With more and more competitive products in the field, and fewer and fewer buyers, this is increasingly important.

(9) Financing. From the time the crop lands on the receiving platform until the retailer pays his bill, money is tied up in it. Money is also tied up in plant facilities, equipment, payrolls.

(10) Product Development. This is an extremely important point.

While the middle marketer is carrying out all these functions, he is also continuously engaged in another one. He is responsible for bringing supply and demand into balance. On one side of him is the farmer producing the raw material — the supply. On the other side is the retailer, with the consumer back of him—the demand. These two forces never meet directly. The middle marketer must deal with each separately.

This year probably will break all previous records in meat production in the United States, exceeding 28 billion pounds of beef, veal, pork, and lamb.

The middle marketer must make commitments to pay for the raw product based on what he thinks he can get for it, without assurance that the price is going to be what he thinks or hopes it will be. This is a dangerous and thankless task. The rewards for doing it successfully can be sub-

stantial, but the penalty for being wrong is disaster. The death rate of firms operating in this middle marketing area is high.

To carry out all the functions I have listed, to operate on the balancing point between supply and demand, to deal with the power of the great retail chains, the middle marketer must be strong. Strength means adequate financing—capital enough to keep his plants modern, enough working capital so that he can market his products in an orderly manner and not have to dump them in order to meet his obligations.

Strength means size, not necessarily giant size, but size enough

Bees, according to a report in a medical publication, fatally injure just about as many Americans in a year as snakes do, that is, about ten people.

to do the things that are necessary in this highly competitive food business; size enough to hire really competent management; size enough to run a truly efficient operation; size enough to carry out effective quality control procedures. The middle marketer has got to be big enough also to carry out a program of research and development. Most of the growth in retail food sales in the last 10 years has been in new, improved products—products which are substantially different from those of a few years ago, products which perhaps were not even invented until rather recently.

Take frozen orange juice, for example. This product gave a new lease on life to the citrus industry. A few years after its development, one-third of all the oranges produced were marketed in the form of frozen concentrates. In eight more years, this had climbed to 85%. While it was doing this, frozen orange juice also resulted in the expansion of the total consumption of oranges.

In western New York, a similar thing may be beginning to happen. Frozen grape juice was invented just about five or six years ago. From the 1957 crop, 113 million cans of this concentrate were marketed.

Instant coffee had been around for a long time, but after the war, some middle marketers began to develop a really improved product. They did market research to find out what the consumer would like, and they did a tremendous lot of product development. In eight years, instant coffee went from 7% of the coffee market to 40%.

Or take cake mix. Today, 50% of all cakes baked in homes are made from packaged mixes.

The middle marketer must

have an assured supply of the commodities he needs in the quantities he needs to run his plant and to supply his customers. He's got to have a balanced line of products—balanced in two ways.

First, he must have products that complement each other in production. It is becoming more and more important to operate a plant 12 months of the year instead of three or four. Processors are looking for combinations that will enable them to do this.

Then the marketer must have a line of products that fit together in selling to the trade.

The final thing that the marketer needs is a brand. A recognized brand name is very important in some commodities, less so in others. Perhaps a better term for what is needed is "reputation." Whether it is the brand name or the firm name that is recognized, the middle marketer, to succeed, must be known as a firm of quality and responsibility —one that puts out a good product and keeps its commitments.

We face a very different marketing situation than was the case a few years back. Today's food marketing is dynamic, competitive, rapidly changing. The question we as farmers and as representatives of farm organizations much face is this: How can the farmer and his organization adjust to the changes that are taking place in the marketing structure?

Individual groups of farmers have made an effort by forming cooperatives and bargaining associations. The federal government has come up with its answers in farm program after farm program. Marketing orders and agreements have been tried—sometimes successfully, sometimes not.

It is my belief that the trend of events is going to force the farmer more and more to produce for a market—to grow the kind of products and quality of products the market wants and the amounts of those products the market will absorb. In doing this, the farmer will be obliged to move further into the marketing of his products than he has yet moved.

From one part of the United States comes a report of bread in colors. In one foreign country bread is being sold in five colors — green, yellow, pink, apricot and white. The bread is being flavored with banana, strawberry, cheese and onion.

All along the line of the marketing flow, we see commitments being made. I believe the farmer is going to have to make com-

mitments, too. Commitments to produce certain things in certain quantities—production contracts. Commitments to market them through certain places and under certain conditions—marketing contracts. Commitments to finance some part of the cost of marketing. The date is fast disappearing when the farmer can grow and worry about disposing of it later.

The historic way farmers have met their production and marketing challenges has been through cooperatives. We have developed many co-ops in the Northeast. Some have done an outstanding job, some a fair job and some have been unsuccessful.

There are exceptions, to be sure, but, in general, those that have been able to do a real job for their members have been cooperatives of substantial size. I do not believe that co-ops today — particularly ones operating in this middle marketing area—can be effective on a small scale. They will have to get together through working agreements, consolidations or mergers to achieve the size to do a real job.

In arguments, the best thing to hold is your tongue.

In food marketing today, there are few buyers and many sellers. Size alone doesn't make an effective bargainer, but it is one of the first steps in developing a bargaining position.

The effective marketing co-op of the future will also have to be selective in its membership. This is a very real change from the philosophy many have been brought up on. But the developments which dictate that a farmer must produce for a market also dictate that a marketing co-op must select members who will produce for a market. It must limit membership to those who have the ability and the willingness to produce the desired quality of product. It may even have to select members on the basis of their efficiency, because only an efficient producer is going to stay in business.

The effective co-op is going to have to raise enough money to provide a sound financial base. This has not always been done in the past and has been one of our real troubles in attempts at cooperative marketing. Some part of this money will have to be supplied by the members themselves. In my view, they couldn't make a better investment.

Finally, the successful marketing co-op must be prepared to pay whatever it takes to hire really top-caliber management. It will have to operate efficiently all along the line. It will have to

spend money in research and development. It will have to advertise and promote its varied line of farm products.

In other words, the cooperative which is going to do a satisfactory job of marketing for its members has got to carry out the functions and meet the specifications that we have listed as belonging to the middle marketer.

This is a challenge to agricultural leadership. It isn't going to be done easily or quickly, but I believe it can be done—and must be done.

We live in an era of abundance. Barring war or disaster, it is probably permanent abundance. Our ability to produce is running far ahead of the growth in population, and will do so for many years to come.

The government has been wrestling with the problem for two decades and will wrestle with it for many more years. I have no confidence in its ability to solve it. I believe the people who must do the job are those who have a stake in its being done—that is, not only the farmers and their cooperatives, but other elements in the food trade—the independent processors and retailers.

Cooperatives have a great role to play if their leadership is willing to step up on the stage and play it.

After 28 years as a co-op employee, I know there is no magic in the cooperative form of business. But I know also that a well-run co-op can be of real help to its farmer members.

A cooperative can improve the returns received by its members by producing the right quality products—products that the market will accept. It can provide its members with an assured market for the things they grow. It can definitely help through orderly marketing, putting the things on the market at the right time and in the right way. By running a truly efficient operation, a co-op can insure that the benefits of this efficiency go back to the members.

A cooperative can influence price, not by virtue of being a monopoly or because it is a co-op, but because it is a strong, effective, competitive force in the market. Let us remember that the price level at which products move is determined by supply and demand. All transactions take place somewhere near the general level—a little bit less or a little more. The most the very

New Jersey swamps yield remarkably well preserved specimens of huge cedar logs, the like of which are found grow-no place on earth now.

best co-op can get is that little more; it can't control the general price level.

To have the kind of cooperative that can be effective in the things I have listed will take size and will take money. It will take another thing also—active participation by farmers. Farmers who wish to benefit will have to invest their time and their interest. Many co-ops have been built by farmers, but the ones who have made the real contribution have been few in number. The great majority have just gone along for the ride.

I believe future marketing co-ops are going to demand a lot more participation and a lot less coaching from the sidelines. I am sure they will require financial participation on the part of their members.

Cattle Fatten Best With 1 Pound Protein Supplement Daily

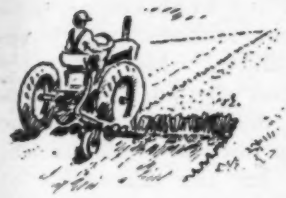
One pound of 26 percent protein supplement per day per steer resulted in the best all-around performance in a heavy-corn fattening ration including stilbestrol in Iowa experiments completed last year, Animal Husbandman C. E. Summers said recently at the Iowa State University Cattle Feeders Day.

He said the 1-pound of supplement was equally effective whether the protein was linseed meal or a mixture of oil meal and urea. The addition of urea to the supplement, Summers said, reduced the cost of feed per pound of gain.

In the same group of experiments, Summers added, the use of linseed meal as the protein source improved the hair-coat bloom of the cattle which was beneficial to the cattle at selling time.

Summers cautioned that the hay fed with this cattle ration, fed at the rate of 3 pounds (dry-matter basis) per day per steer, contained 14.9 percent protein. This was high-quality hay. Many hays used in cattle feeding do not contain this much protein. Therefore, he pointed out, where hay of lower quality is used, it would be necessary to increase the amount of protein supplement in order to get the same results obtained with 1 pound of supplement in these experiments. The ration must be figured so that the total ration is 9½ percent protein. Neither is this low level of protein able to give best results unless stilbestrol is included in the ration at the rate of 10 milligrams per steer per day. —*Iowa State University*

What Is Forage Quality ?



Learn to understand the terms of forage nutritive values . . .

Condensed from The Ayrshire Digest

B. R. Baumgardt, Rutgers University

PROFITABLE dairying lies in the efficient use of grass and grassland products.

During recent years rapid advances have been made in the improvement of forage crops, particular attention being paid to the improvement of persistency, disease resistance and dry matter yield per acre. The dairyman often judges the success of his grassland program in terms of tons of hay and silage harvested year after year. In many cases he fails to realize that the ultimate criterion of the worth of a forage must include a measure of its feeding value to animals.

Quality of Roughages Important

The elusive term 'quality' has been used to describe forages and adjectives such as 'low,' 'medium,' and 'high' have been added to indicate degrees of suitability or feeding value. The lack of a more precise expression has been due, at least in part, to the lack of a simple method for determining the feeding value of a forage for animal feeding.

Feed Constituents—Chemical Analyses

When describing feeds agricultural chemists divide the constituents into six main groups: (1) Water or moisture (2) Crude protein (3) Either extract or fat (4) Crude fiber (5) Nitrogen-free extract (6) Ash or mineral matter. It is extremely important to realize, however, that the chemical analysis of a feedstuff does not tell the whole story since it does not measure the true value of the material to the animal. It is the amount which is digested that really matters, and this is usually measured by experiments with animals in a digestion trial. In its simplest form it consists of feeding weighed amounts of feces excreted. From these data the percent and amount of nutrients that are actually digested can be calculated. The experiment is usually conducted with several animals with the test lasting for sev-

Reprinted by permission from The Ayrshire Digest, Brandon, Vermont

eral days or even weeks. While digestion trials give much information concerning the nutritive value of forages, the technique is too demanding in terms of time, labor and facilities to be used for routine testing of the roughages available on numerous farms.

Measures of Nutritive Value

Realizing the need for a simple, accurate method of measuring the nutritive value of forages, researchers have attacked the problem in a number of ways. Thurman and Wehunt of Arkansas proposed a method for determining digestible laboratory nutrients (DLN) which involves a mild acid hydrolysis of the forage sample: the weight loss upon hydrolysis, expressed as a percent, equals DLN. This and several other proposals were tested by Baumgardt, Cason and Markley of Rutgers, using samples of hays of known nutritive value as determined in conventional digestion trials. No significant relationship was found between DLN measured in the laboratory, and TDN measured with animals. Although the DLN method has the advantage of simplicity, it lacks the necessary accuracy to be used as a reliable means of estimating nutritive value. Several prediction equations have been developed by research workers for the estimation of TDN from the chemical composition of forages. The accuracy of these equations was checked and again there was no significant relationship with actual nutritive value. This only emphasizes what has already been pointed out, i.e. nutritive value embraces not only crude nutrient content but also digestibility or availability of the nutrients.

Rumen Action of Major Importance

Other approaches which have been more rewarding to the problem of forage evaluation have been made by researchers at Rutgers, Penn State, and West Virginia. In this work several basic facts have been taken into consideration. Ruminants (cattle, sheep and goats) are unique among the common farm animals in that they can obtain a large part of their feed nutrients from roughages. This is possible because these animals possess a large fermentation vat in the form of the rumen. In this organ billions of microorganisms break down the roughage cellulose for the cow. The digestion of roughages and isolated cellulose has been studied in test tubes in the laboratory using what is commonly called the 'artificial rumen.' The development of the artificial rumen technique seemed to offer a meth-

Plants and people grow and prosper, it seems, in direct relationship to the things they find about and under them.

od for studying the digestibility of forages and in fact, a method for estimating nutritive value. Samples of liquid material are taken from the rumen of a cow and placed in a tube or flask; this serves as an inoculum supplying the normal rumen microorganisms. Small amounts, usually 1 or 2 grams, of finely ground forage are added to this along with a mineral solution. The latter provides the microorganisms with the essential minerals and maintains the pH within the normal limits. Each flask is sealed and allowed to ferment at about 102° F. (rumen temperature). After 24 hours of fermentation the amount of the roughage cellulose that has been digested can be determined.

Mathematical relationships have been developed whereby it is possible to estimate the digestible energy (DE) content of a forage from the cellulose digestion of that forage in an artificial rumen. Table 1 compares digestible energy values predicted from cellulose digestion in the artificial with the digestible energy values obtained in a digestion trial. With this simple approach, a technician, can accurately estimate the actual nutritive value of many forages (perhaps 50 to 100) in a matter of 2 or 3 days.

In evaluating forage quality, it is desirable to know the amount of digestible protein as well as digestible energy. Baumgardt from Rutgers, Pigden from Canada, Reid from Cornell, and others have found a high relationship between crude and digestible protein. In the Rutgers study the correlation coefficient (r) was 0.999 which means that there is nearly a perfect relationship between crude and digestible protein.

TABLE 1.

THE ACCURACY OF DIGESTIBLE ENERGY VALUES PREDICTED FROM CELLULOSE DIGESTION

Forage	Cellulose Digestion	Digestible Energy Predicted	Digestible Energy Animal
	%	calories/ gram	calories/ gram
Alfalfa	43.97	2753	2687
Alfalfa	45.12	2791	2790
Bromegrass	50.66	2975	2956
Bromegrass	53.49	3069	3091
Orchardgrass	57.06	3187	3168
Reed Canarygrass	48.20	2894	2932
Reed Canarygrass	47.03	2855	2777
Reed Canarygrass	49.08	2923	3023
Timothy	36.90	2519	2595
Timothy	36.54	2506	2501

From this data a regression equation was calculated to predict the digestible protein (Y) from the crude protein content (X) of forages: both values being expressed as a per cent of forage dry matter. This equation is: Y equals -3.619 plus 0.931X.

Summary and Outlook

Forage quality embraces not only the nutritive value (TDN or DE) of the forage but also the rate at which the forage is consumed by the animal. The results and discussion above indicate the possibilities of measuring the nutritive value or digestibility of forages by simple laboratory procedures such as the artificial rumen. However, few studies have been made of the forage factors which influence the voluntary rate of consumption of that forage by ruminants. More specifically, there are few reported attempts to obtain an estimate of forage acceptability through laboratory techniques (e.g. the artificial rumen). Although unproven, there are indications that the rate of breakdown of a forage in the rumen (and rate of passage) influence the amount of that forage that would be voluntarily consumed by the animal. If this is so, possibly the subsequent rate of consumption by the animal could be estimated from the rate of fermentation in the artificial rumen. Experiments of this type are now being carried out by the Rutgers group.

Forage testing laboratories, similar to soil testing laboratories, *are now becoming a reality.* As adequate laboratory methods are developed to (1) accurately estimate nutritive value and (2) obtain a prediction of the voluntary consumption of forages, a rather complete indication of overall forage quality can be obtained. Through these services the dairyman could obtain an estimate of the value of his own forage and thus know how to best supplement that forage to most efficiently satisfy the needs of his herd.

Twice Size Doesn't Mean Twice Work Done

When you double the size of a farm machine you do not double your capacity to do work.

For example, an 8-row corn planter pulled by one tractor will not plant as much corn as two 4-row corn planters pulled by separate tractors. You spend more "down-time" filling seed and fertilizer hoppers, turning, etc., with the larger machine.

—Iowa Farm Bureau Spokesman

Which Cows Are Best Producers?

Here's a method of finding out which are your best cows . . .

Condensed from Butter-Fat

M. A. Cronkhite

WE commonly judge a cow only by the amount of butterfat or milk produced.

This method is handy but ignores other important aspects of pricing, quotas and the relation of the rest of the herd.

Our present system of pricing in the quota pays a premium for low-test milk. Price is based on 3.5 or 4 percent milk with a differential adjustment for variation in test but the effect is a higher price per pound of butterfat at lower tests.

As an example let us assume the price is $5.00 per cwt. for 4 percent milk with a differential of $0.75. In this case a pound of butterfat would be priced as follows:

5% milk: 5.00 + .75 divided by 5 equals $1.15.

4% milk: 5.00 divided by 4 equals $1.25.

3% milk: 5.00 — .75 divided by 3 equals $1.42.

2% milk: 5.00 — 1.50 divided by 2 equals $1.75.

Therefore, a cow producing 400 lbs. of fat in 3% milk, compared to a cow producing 400 lbs. of fat in 5% milk could produce as much as $108 more revenue, depending on the proportion of quota. Another interesting observation is that a low-test cow may increase the value of a high-test cow by lowering the overall test.

An obvious way to increase profits is to increase the proportion of higher priced quota milk. Since we generally assume the manufactured price merely pays the cost of producing, there is no advantage to producing "excess" milk unless it affects our quota. A cow is valuable to the herd in relation to her contribution to the quota, not necessarily her total produc-

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tion. Highest quota (and maximum returns) will result when an even level of herd production is maintained throughout the year. One cow may be of more value to the herd than another because of the time of year she is milking. We must then calculate a cow's production in terms of contribution to quota.

I would suggest calculating production in the following manner: First estimate the total production from the previous year and divide by twelve for the monthly average. Next adjust the production figures for each cow to estimate the contribution she makes toward the monthly average. Take the average monthly production, divide it by the production for the month, and multiply it by each cow's monthly production. e.g.—

Average monthly herd prod. divided by herd prod. for the month × cow production equals adjusted production.

For example: If the average total production for a herd were 250 cwt., and the production for a particular month was 200 cwt.; then a cow that produced 1200 lb. would have her production adjusted to 250 divided by 200 × 1200 equals 1500 lbs.

A cow should have a record of real production and an adjusted record of production for each month of the year. Yearly totals of real and adjusted production would show the value of the cow as an individual and its relative value in the herd. The value of a cow in a herd could be changed by shifting breeding dates or feeding heavily at the right time.

Today's Cows Need Wider, Longer Stalls

The 3½-foot wide stall is a thing of the past, except perhaps for island type Jerseys, declares W. C. Krueger of Rutgers University. Modern cows have been bred for larger frames and more weight.

The standard stall of a generation ago just does not fit today's animal, the engineer says. Injuries to hocks, knees, udders and teats are prevalent. Mastitis is invited by having cows hang over the sharp edge of the gutter.

Stalls for the larger breeds must be at least 4 feet wide, up to 4 feet, 6 inches; stall lengths start at 5 feet instead of the traditional 4-foot, 6-inch dimension.

The problem of keeping cows clean on such longer beds has effectively been solved by placing the electric cow trainer over the cow just back of her shoulders. This discourages her from arching forward and helps to keep the stall clean. —*Rutgers University*

Crossbreds In Today's Farming

Haphazard mixing of breeds is certainly no magic formula for success in the livestock business. But as the author points out, crossbreeding can be profitable if you know how . . .

Condensed from The Country Guide
Dr. W. E. Howell, Associate Professor of Animal Husbandry, University of Saskatchewan

THERE'S a wonderful opportunity and an exciting prospect for the livestock producer who is ready to streamline his operation in the light of modern breeding techniques. All it requires is a bit of know-how and guidance, and a lot of organization and co-operation.

Let us start with a simple outline of what livestock breeding is about. It will be agreed that the ultimate function of livestock is to serve man's needs, and that some breeds are better adapted to render this service than others, under certain conditions. However, if no adapted breed with the desired economic features exists, a combination of two or more breeds (crossbreeding) may provide a useful type. For example, there are the Brahman x British breed crosses in the southern U.S.A.

Where two or more breeds show their adaptability to the environment and suit the market requirements, efficiency of production may be increased simply by crossing the breeds. Hybrid vigor is the popular name for this boost in vitality, growth, disease resistance, fertility, and production of milk, wool, meat or eggs, and so on, which is often apparent in crossbred livestock.

The wonderful success of hybrid corn has led to an effort on the part of livestock breeders to secure similar benefits from hybrid vigor in animal production. The systematic crossing of breeds of livestock has been practiced for a long period in Europe. In the British Isles, Blue-Gray cattle (Angus-Shorthorn or Galloway-Shorthorn) have long enjoyed an enviable reputation both in the show ring and on the fat stock markets. Many breeds of sheep are also crossed for the production of market lambs not only in the British Isles but in North America and New Zealand and Australia. Crossbreeding in swine

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is an established and profitable practice in many countries.

In general, experiments on crossbreeding show an advantage of the crossbreds over comparable purebreds. The advantage has not been sensationally large in all cases, nor has it been consistently in favor of the crossbreds in every respect; but there has been enough advantage to justify the practice for commercial livestock production.

Beef Cattle

The University of Saskatchewan's beef cattle crossbreeding study conducted by Shaw and MacEwan some years ago, showed definite advantage for the crossbreds over their purebred relatives in rate of gain and quality of carcass.

A recent Canadian study compared the performance of Charbray x Hereford steers with straightbred Hereford steers out of the same herd of range cows. The crossbreds were 71 lb. at weaning, and 131 lb. heavier after a 242-day feeding period than the straightbred Herefords were. The eye of lean was larger and the muscle fibers smaller in the crossbreds, and above all, the net profit per carcass favored the crossbred group.

Studies at Miles City, Montana, comparing purebred Hereford steers with Shorthorn x Hereford steers showed that the crossbreds were 15 lb. heavier at weaning and 85 lb. heavier after 252 days on feed. They gained better than a quarter of a pound more per day on feed, and on less feed per 100 lb. of gain. The crossbreds had a dressing percentage of 57.7 vs. 56.3, sold at a higher price per lb., and returned nearly 8 per cent more profit above feed and marketing costs than did the straight Hereford steers. One of the most interesting observations, and one of considerable importance, was that the crossbred steers had fewer digestive disturbances, such as bloat, scouring, off-feed, etc., than the purebreds had.

A continuation of the Miles City studies involved breeding the Shorthorn x Hereford females to Aberdeen-Angus bulls. The heifer calves from this cross were grown out and bred to Hereford bulls to complete the cycle. Each generation of crossbreds outdid the previous generation in production characteristics, and the differences between crossbreds and purebreds widened with each generation. These results illustrate

One strip of new highway, 8.3 miles long, near St. Louis, cost as much money as our government paid for the entire Louisiana Purchase, from which 17 states were carved.

the distinct advantage to be gained from using crossbred females as breeding stock.

Dairy Cattle

The rather few crossbreeding experiments with dairy cattle have involved breeds differing widely in their production characteristics. Hence, a breed such as the Holstein has been crossed with the Jersey bringing together high volume-low test with a low volume-high test. Hybrid vigor was evident in the higher fat yield obtained in this crossbred, but neither volume nor test exceeded the better parent in more than a few cases.

However, these observations were based on single lactations and not lifetime production. It might well be that the crossbred would excel the better parent in milk volume as well as fat yield, if longevity were taken into account. Nor can we conclude from this the results to be obtained from crossing breeds with similar production capacities such as Holstein and Ayrshire. A rather general recommendation to dairymen would be to use the best sire available for the production characteristics they want, whether this involves crossbreeding or straight breeding.

Swine

A very large crossbreeding study conducted with swine in Minnesota has shown several interesting results, from which very important conclusions and recommendations can be drawn for the commercial livestock breeder.

1. The production from 2-breed crosses, 3-breed crosses and backcrosses was superior to the comparable purebreds that went into the crosses.

2. The greatest increase over the purebreds was noted in the 3-breed cross combination.

3. The crossbred sows were superior to purebreds for producing market pigs. The resulting pigs benefited as much from being out of crossbred sows as they did from being crossbreds themselves.

4. The crossbreds had larger litter size and greater litter weight at weaning, needed less time to reach market weight, and less feed for a pound of gain in live weight.

A common toad, according to one estimate, is worth 25 dollars a year to a farmer, due to the large number of insects he eats.

5. The crossbred litters averaged from one-third pig to 2 pigs larger at weaning. On the average, each pig weighed from 5 to 7 lb. more at weaning, and the litters weighed from 39 to 96 lb. more than the purebreds.

6. The crossbred pigs reached a market weight from 17 to 22 days earlier than the comparable pure-

breds, and they reached that weight on from 27 to 36 fewer pounds of grain.

A review of a number of crossbreeding studies with swine can be summarized as follows:

- The percentage of stillborn piglets was less among crossbreds than among purebreds.
- Crossbreed pigs were more vigorous at birth and had a greater percentage survival to weaning.
- The crossbred averaged 3 to 4 lb. heavier at weaning than the purebred pig.
- Crossbreds made more rapid gains in the feedlot and on less feed (0.12 lb./day more gain, and 13 lb. less feed per 100 lb. gain).
- Crossbred sows were more fertile and better milkers, and hence more efficient pig producers than straightbred sows.

Crossbred Females

Controlled experiments with large numbers of swine have shown an increase in production over purebreds of 6.3 per cent for a 2-breed cross, and 11.7 for 3-breed crossbred animals. The difference between the 2-breed cross and the 3-breed cross is partly because the latter are out of crossbred females whereas the former are out of purebred females.

Not only do crossbred animals show superior productive capacity, but the crossbred females also excel in reproductive potential. There is ample evidence that crossbred females are more fertile, and in the case of sheep and swine, the crossbreds give birth to greater numbers of young.

Crossbred females are also superior in their mothering ability because their hybrid vigor imparts to them a greater potential for both prenatal and postnatal nourishment of the young. The prenatal and preweaning periods make up better than half of the total life of a meat animal from its conception to slaughter. Consequently, if the crossing of two breeds results in sufficient increased vigor to make crossing worthwhile, then the crossbred females should in turn be sufficiently more vigorous to make better mothers than purebred or high grade animals. This principle is very well illustrated by experiments with swine which have shown a production advantage of 6 per cent in favor of crossbred pigs from crossbred mothers over crossbred pigs from purebred mothers.

About ten years elapse between the beginning of successful, new farm research and its adoption by farmers in sizeable numbers.

Crossing Methods

With respect of this last point, there have been two methods

recommended to the farmer for a continuous program of crossing, no matter what class of stock he is dealing with. The first method is called crisscrossing and calls for the alternate use of sires belonging to two breeds. The second method, called rotational crossing, is exactly the same except that sires of three or more breeds are used alternately in a round-the-clock fashion.

In swine, the crisscross system might alternate between boars of the Lacombe (or Landrace) and Yorkshire breeds. A rotational scheme could include all three.

In 1890, 25 minutes of an average factory worker's time was required to earn enough to purchase one quart of milk. In 1958, he worked 7 minutes, 6 seconds. In 1960, only 6 minutes, 48 seconds.

For ease of breeding management, the entire sow herd could be replaced every third or fourth year with replacements grown out from a previous farrowing and a new boar of the next breed obtained.

The crisscross method in beef cattle might utilize the Shorthorn bull on Hereford cows for the first 2 years, then put Hereford bulls in for the next 2 years, and then go back to Shorthorn bulls, and so on. Rotational crossing would require going to Aberdeen-Angus and/or Charolais after the Shorthorn bulls, and then to Hereford b e f o r e starting over again with the Shorthorn.

The same systems applied to sheep might utilize surplus range ewes as foundation females bred to Suffolk rams the first 2 years, followed by Hampshire rams, and back to Suffolk, etc., or on to Shropshire and/or Oxford, before going back to begin the cycle with Suffolk again.

The systems just described for beef cattle and sheep merely require that the males be changed to the next breed when their daughters are of breeding age. However, if maximum hybrid vigor is to be obtained from a continuous crossing scheme, it would require separation of the female stock into groups for breeding to males of the appropriate breed. This would require a separate breeding pasture for each group. There is the further disadvantage to farmers with small herds, or flocks, of having to keep more males than would be warranted by the number of females. This may not be too serious an objection in the case of sheep since rams are relatively cheap. In the case of beef cattle it could prove too costly unless advantage could be taken of artificial breeding, which would also overcome the problem of having to separate the herd into two or more breeding groups, as would be the case in natural breeding.

Each of these limitations that confront the "small" operator would be overcome if some breeders would undertake to go into the business of producing the first-class females for sale as breeding stock to the commercial producer, who would make the final cross and market all the offspring. The commercial producer would then be relieved of having to raise his own replacements, and could therefore carry a larger herd of breeding females, have a much greater turnover, and continue to use the same breeding males as long as they performed satisfactorily.

The middleman in this scheme would likewise purchase female replacements from the breeder of straightbreds. In the case of beef cattle and sheep, the source of straightbred females might very well be the surplus from range herds and flocks now being sold as feeders. Breeders who would specialize in the production of such replacement crossbred stock could very well become an additional and an important segment of our livestock industry.

Purebred Sires

It would be folly to use crossbred sires. The reasons are: (1) Crossbred females mated to a sire of the same cross would produce offspring containing a great deal of variability in type and performance. (2) In order to conduct a continuous crossing program, one of the parents must be a purebred, and it is easier and cheaper to replace males than females. (3) Offspring benefit directly throughout the prenatal and preweaning periods from the increased vigor of the crossbred mother, but could not derive any such benefit from a crossbred sire.

The utilization of the hybrid female is not a reversion to the old system of promiscuous breeding, but the adoption of a system which is of value only when males of high breeding value are available. We would still need the purebred, in fact more so. Many farmers are still using grade sires, but if they are going to follow a method of continuous cross-breeding, they will have to utilize purebred sires for best results, and so an increased demand for purebred sires should follow.

The purebred breeder has nothing to fear but everything to gain from an acceptance by the commercial producer of these methods of production. But the purebred breeder on his part must assume increased responsibility for the development of high performing, purebred animals. This will require that purebreeders pay more attention to the productive qualities of their stock in making their selections for breeding animals.

Tomorrow is the greatest labor-saving device of today.

AN ABC OF CROSSBREEDING

- Crossbreeding is intended to increase efficiency of production through marketing more animals in a shorter time on less feed.
- Hybrid vigor, a characteristic of crossbreds, means a boost in vitality, growth, disease resistance, fertility and production.
- The quality of individuals used in a crossbreeding program is as important as the choice of breeds.
- The mating of crossbred females to purebred males is the key to greatest benefits from crossbreeding.
- Crisscrossing and rotational crossing are two methods recommended to farmers for a continuous crossing program.
- Crisscrossing calls for the alternate use of sires of two different breeds. Rotational crossing is exactly the same, except that sires of three or more breeds are used alternately.
- An alternative method is to purchase selected crossbred females and mate them to the same unrelated male, year after year; then to market all the offspring.

The good purebred sire is the basis for the improvement of any class of commercial livestock. This is equally true whether the producer is following a continuous crossbreeding system or grading-up (breeding males of one purebred to successive generations of females). Crossbreeding will not solve any difficulties or contribute anything to improved production unless good purebred sires are used. Nor will crossbreeding yield the desired results unless the animals are receiving the proper care, feed and management.

Summing Up

Now, you will probably say: "Sure it may be all right but you can count on a cent or two less per pound than the straight breed fetches on the same market." This is perhaps true in swine and to a degree in feeder cattle, but is not at all the case in sheep or in fat cattle. Such discrimination as does exist is usually based on the presence of color in the case of swine, and to non-conformity to an accepted color pattern in the case of cattle. But when it comes right down to dollars and cents, the producer is still ahead because he can market more animals in a shorter time on less feed.

If so simple a procedure as using a male of a different breed will result in a 10 to 12 per cent increase in production, then it is well worth consideration.

You must bear in mind, however, that crossbreeding is not a "cure-all" for every ill causing low production. Nor can every combination of breeds be expected to show improved production. But, certain combinations can be recommended from results already known from trials. There must be a plan and the plan must be followed closely. The quality of the individuals used in a crossing program is every bit as important as the choice of breeds used.

As we said at the start—there's a wonderful opportunity and an exciting prospect for the livestock producer who is prepared to streamline his operation in the light of modern breeding techniques.

Copper Compounds Boost Gains And Feed Efficiency In Pigs

Copper sulphate in the rations of baby pigs from 2 to 8 weeks of age increased the pigs' daily gains 19 per cent and feed efficiency more than 6 per cent over gains and feed efficiency in pigs not receiving the copper sulphate in Iowa State University experiments.

Researcher R. J. Bunch reported that the copper sulphate evidently acts similarly to antibiotics in controlling intestinal microorganisms. Feed efficiency and rate of gain in the lots receiving copper sulphate were slightly improved as compared with lots receiving 50 milligrams of antibiotic (chlortetracycline) per pound of feed. The copper sulphate was fed at the rate of 250 parts per million of copper in the total ration. Copper oxide fed at the same rate also improved gains and feed efficiency to nearly the same extent as the copper sulphate or chlortetracycline. —*The Berkshire News*

With the cost of labor, equipment and fertilizer so high, farmers and home-owners should avoid wasting their time by using low quality seed this spring. The best way to make sure of using good quality seed is to have it tested. Testing will show insect damage; chemical overtreatment with fungicides and pesticides; seed-borne diseases; kind and amount of weed seed; and the capabilities of the seed sample.

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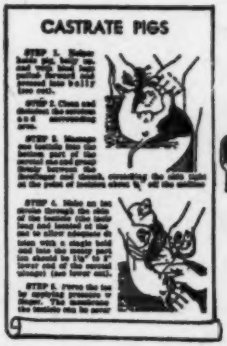

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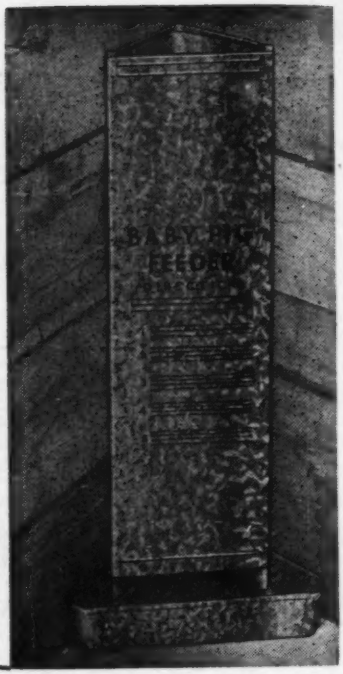

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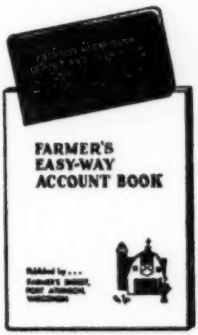

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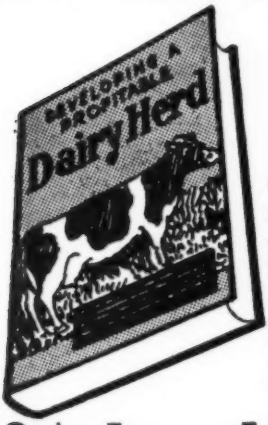

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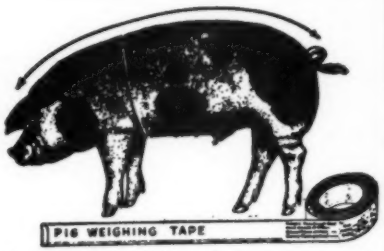

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